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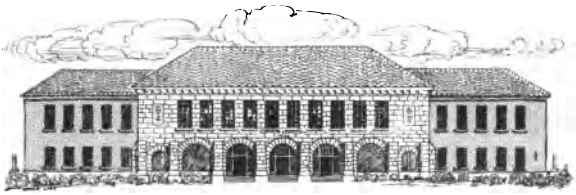

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MATHEMATICS FOR COMMON SCHOOLS

PART II

INTERMEDIATE ARITHMETIC

INCLUDING

EXERCISES IN SOLVING SIMPLE ALGEBRAIC EQUATIONS CONTAINING ONE UNKNOWN QUANTITY

BY

JOHN H. WALSH

ASSOCIATE SUPERINTENDENT OF PUBLIC INSTRUCTION,
BROOKLYN, N.Y.

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CONTENTS. — PART II.

CHAPTER VI.

PAGE

MIXED NUMBERS — FEDERAL MONEY — BILLS — DENOMINATE NUMBERS — DECIMALS — MEASUREMENTS 213

MIXED NUMBERS 213

Addition of Mixed Numbers 217

Multiples and Factors 218

Subtraction of Mixed Numbers 220

NOTATION AND NUMERATION 224

Multiplication of Mixed Numbers 231

Division of Mixed Numbers 234

FEDERAL MONEY 236

Fractional Parts of a Dollar 239

Division of Federal Money 245

Sight Approximations 247

DENOMINATE NUMBERS 250

Time Measure 250

Dry Measure 251

Avoirdupois Weight 251

Liquid Measure 251

Special Drills 254

BILLS 263

DECIMALS 264

Notation and Numeration 265

Addition of Decimals 267

Subtraction of Decimals 268

Multiplication of a Decimal by an Integer 268

Division of a Decimal by an Integer 270

MEASUREMENTS 277

CHAPTER VII.

PAGE

FRACTIONS — DECIMALS — BILLS — DENOMINATE NUMBERS — MEASUREMENTS 280
ADDITION OF FRACTIONS 280
SUBTRACTION OF FRACTIONS 281
Factors and Multiples 281
Prime Numbers 282
Greatest Common Divisor 283
Lowest Terms 283
Least Common Multiple 285
ADDITION AND SUBTRACTION OF FRACTIONS 286
Special Drills 291
Cancellation 296
MULTIPLICATION OF FRACTIONS 298
DIVISION OF FRACTIONS 300
Fractional Parts of a Dollar 309
BILLS 311
Short Methods 316
MULTIPLICATION OF DECIMALS 318
DIVISION OF DECIMALS 319
Sight Approximations 322
DENOMINATE NUMBERS 327
Long Measure 327
MEASUREMENTS 330

CHAPTER VIII.

DECIMALS — BILLS — DENOMINATE NUMBERS — MEASUREMENTS — PERCENTAGE — INTEREST 337
DECIMALS 337
Reduction 337
Addition 338
Subtraction 339
Multiplication 339
Division 339

PAGE
MEASUREMENTS 345
Special Drills 346
Short Methods 352
Approximations 355
DENOMINATE NUMBERS 357
Reduction Descending 364
Reduction Ascending 366
Addition and Subtraction 367
Multiplication and Division 370
PERCENTAGE 372
BILLS 376
INTEREST 377
AREAS OF RIGHT-ANGLED TRIANGLES 379
Short Methods 381

CHAPTER IX.

DENOMINATE NUMBERS — SURFACES AND VOLUMES — PERCENTAGE — INTEREST 389
DENOMINATE NUMBERS 389
Reduction Ascending and Descending 389
Compound Addition 392
Compound Subtraction 394
Compound Multiplication 395
Compound Division 396
Special Drills 400
Short Methods 403
Avoirdupois Weight (Long Ton) 404
MEASUREMENTS 408
Time between Dates 411
PERCENTAGE 415
INTEREST 415
Approximations 419

PAGE

SURFACES 419
Square Measure 420
VOLUMES 424
Approximations 426
Cubic Measure 427
Troy Weight 427
ANGLES, TRIANGLES, QUADRILATERALS 443
Areas 445

CHAPTER X.

ALGEBRAIC EQUATIONS 447
ONE UNKNOWN QUANTITY 447
Clearing of Fractions 451
Transposing 455

INTERMEDIATE ARITHMETIC.

CHAPTER VI.

MIXED NUMBERS. — FEDERAL MONEY. — BILLS. — DENOMINATE NUMBERS. — DECIMALS. — MEASUREMENTS.

MIXED NUMBERS.

447. Oral Exercises.

How many halves in 1? How many fourths in 1? Six halves = ? 12 fourths = ? 6 thirds = ? 12 sixths = ?

448. Slate Exercises.

Add:

1.	2.	3.	4.	5.
$7\frac{1}{2}$	$5\frac{3}{4}$	$18\frac{2}{3}$	$3\frac{2}{5}$	$74\frac{1}{5}$
18	$39\frac{1}{4}$	$150\frac{2}{3}$	$\frac{1}{5}$	$3\frac{7}{5}$
$27\frac{1}{2}$	17	$57\frac{2}{3}$	$27\frac{2}{5}$	$\frac{1}{5}$

449. Oral Exercises.

$\frac{2}{2}$ = ? $\frac{3}{2}$ = ? $\frac{5}{2}$ = ? $\frac{9}{2}$ = ? $\frac{11}{2}$ = ? $\frac{18}{2}$ = ?

450. A mixed number is a whole number and a fraction.

451. Reduce to a whole number or to a mixed number:

$\frac{12}{8}$ $\frac{15}{4}$ $\frac{17}{2}$ $\frac{18}{6}$ $\frac{28}{4}$ $\frac{21}{8}$ $\frac{11}{5}$

452. Slate Exercises.

Add:

6.	7.	8.	9.	10.
$3\frac{1}{2}$	$8\frac{3}{4}$	$9\frac{2}{3}$	$318\frac{1}{5}$	$87\frac{9}{10}$
95	$29\frac{1}{2}$	$48\frac{1}{6}$	$5\frac{3}{4}$	$17\frac{2}{5}$
$254\frac{1}{2}$	$73\frac{1}{4}$	$35\frac{1}{8}$	$52\frac{7}{8}$	$3\frac{3}{10}$
$7\frac{1}{2}$	$6\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$69\frac{1}{5}$

453. Oral Exercises.

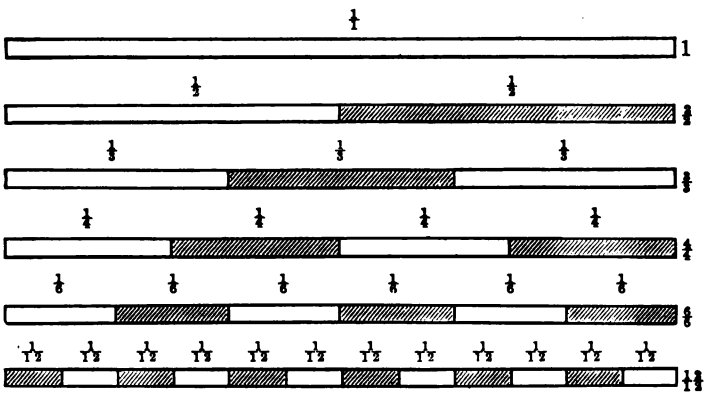
How many quarts in a gallon?

What part of a gallon is a quart?

$\frac{1}{2}$ gallon = how many quarts? $\frac{1}{2}$ = how many fourths?

How many quarts in a peck? What part of a peck is one quart? One-half peck is how many quarts? One-half peck = how many eighths?

$\frac{1}{4}$ peck is how many quarts? $\frac{1}{4}$ = how many eighths? $\frac{2}{4}$ = how many eighths? $\frac{3}{4}$ = how many eighths?



454. Draw a line one foot long. Draw a second line of the same length; divide it into halves. Divide a third line of the same length into three equal parts. Divide three other lines, one into fourths, one into sixths, and one into twelfths.

How many inches in a foot? What part of a foot is one inch? $\frac{1}{2}$ foot = how many inches? $\frac{1}{2}$ = how many twelfths?

$\frac{1}{3}$ = how many twelfths? $\frac{2}{3}$ = how many twelfths? Change $\frac{1}{4}$ to twelfths. Change $\frac{2}{4}$, $\frac{3}{4}$ to twelfths. How many twelfths = $\frac{1}{6}$? $\frac{2}{6}$? $\frac{3}{6}$? $\frac{4}{6}$? $\frac{5}{6}$? $\frac{6}{6}$?

$\frac{2}{12} = \frac{?}{6}$ $\quad$ $\frac{3}{12} = \frac{?}{4}$ $\quad$ $\frac{4}{12} = \frac{?}{6} = \frac{?}{3}$

$\frac{6}{12} = \frac{?}{6} = \frac{?}{4} = \frac{?}{2}$ $\quad$ $\frac{8}{12} = \frac{?}{6} = \frac{?}{3}$ $\quad$ $\frac{9}{12} = \frac{?}{4}$

$\frac{10}{12} = \frac{?}{6}$ $\quad$ $\frac{12}{12} = \frac{?}{6} = \frac{?}{4} = \frac{?}{3} = \frac{?}{2}$

How many inches in $\frac{1}{2}$ ft. + $\frac{1}{3}$ ft. + $\frac{1}{4}$ ft. + $\frac{1}{6}$ ft. + $\frac{1}{12}$ ft.? How many feet and inches?

How many 12ths in $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} + \frac{1}{12}$? Change to a mixed number. Change the fractional part to a different fraction having the same value.

What fraction of a dime is 1 cent? $\frac{1}{2}$ dime = how many cents? $\frac{1}{2} = \frac{?}{10}$.

$\frac{1}{5}$ dime = how many cents? $\frac{1}{5} = \frac{?}{10}$. Change $\frac{2}{5}$ to tenths. $\frac{3}{5}$. $\frac{4}{5}$. $\frac{5}{5}$.

Add $\frac{1}{2}$ dime, $\frac{1}{5}$ dime, and $\frac{1}{10}$ dime. How many cents? How many tenths = $\frac{1}{2} + \frac{1}{5} + \frac{1}{10}$? Can you change the answer to a different fraction having the same value?

455. Slate Exercises.

Add:

11.	12.	13.	14.	15.
$91\frac{1}{2}$	$62\frac{1}{2}$	$34\frac{1}{2}$	$9\frac{1}{2}$	$31\frac{1}{2}$
$270\frac{1}{4}$	$53\frac{1}{5}$	$6\frac{1}{4}$	$16\frac{1}{3}$	$183\frac{1}{3}$
$3\frac{1}{3}$	$95\frac{1}{10}$	$17\frac{1}{6}$	$25\frac{1}{6}$	$2\frac{1}{6}$
$\frac{1}{16}$	4	$28\frac{1}{3}$	7	$30\frac{1}{4}$

456. Oral Exercises.

Show by a diagram that $\frac{1}{4}$ is the same as $\frac{2}{8}$.

How do we add $\frac{1}{3}$ and $\frac{1}{4}$? Show by a diagram.

How many hours in a day? In $\frac{1}{2}$ day? In $\frac{1}{3}$ day? In $\frac{1}{4}$ day? In $\frac{1}{6}$ day? In $\frac{1}{8}$ day? In $\frac{1}{12}$ day?

Change $\frac{1}{2}$ to twenty-fourths. $\frac{1}{3}$. $\frac{1}{4}$. $\frac{1}{6}$. $\frac{1}{8}$. $\frac{1}{12}$.

Reduce $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{2}{8}$, $\frac{3}{8}$, $\frac{7}{12}$, $\frac{5}{8}$, $\frac{11}{12}$ to 24ths.

457. Slate Exercises.

Add:

16. $9\frac{1}{2}$	17. $27\frac{3}{4}$	18. $33\frac{5}{24}$	19. $63\frac{1}{8}$	20. $87\frac{1}{4}$
$8\frac{1}{8}$	$9\frac{1}{8}$	$6\frac{1}{12}$	$9\frac{3}{8}$	$53\frac{5}{6}$
$26\frac{3}{8}$	$100\frac{1}{2}$	$92\frac{1}{8}$	$\frac{1}{24}$	$9\frac{1}{12}$
21. $46\frac{5}{16}$	22. 36	23. $275\frac{1}{2}$	24. $93\frac{2}{3}$	25. $23\frac{3}{9}$
$5\frac{1}{2}$	$74\frac{3}{5}$	$54\frac{3}{10}$	$6\frac{1}{2}$	$65\frac{1}{3}$
$\frac{1}{8}$	$9\frac{1}{25}$	$27\frac{1}{4}$	$74\frac{1}{8}$	$23\frac{1}{6}$
$207\frac{1}{4}$	$81\frac{2}{5}$	$6\frac{1}{5}$	87	$9\frac{1}{2}$

458. Oral Problems.

1. I spent $\frac{1}{2}$ of a dollar for a ball and $\frac{1}{10}$ of a dollar for a bat. What part of a dollar did I spend for both?

2. $\frac{1}{2}\frac{2}{4}$ = how many fourths?

3. What will be the cost of a pen-knife at $\frac{3}{5}$ of a dollar, and a book at $\frac{1}{2}$ of a dollar?

4. Write $\frac{1}{2}\frac{6}{0}$ with smaller numerator and denominator.

5. I need $\frac{1}{8}$ of a yard of ribbon for one hat and $\frac{1}{8}$ of a yard for another. How much ribbon must I buy?

6. Write a fraction equal to $\frac{9}{12}$ with the smallest numbers you can. (This is called reducing a fraction to lowest terms.)

7. Sold $\frac{3}{8}$ of a pound of tea to one customer and $\frac{7}{8}$ to another. How much was sold to both?

8. What quantity of oats must I buy to give $\frac{3}{4}$ of a peck to one horse and $\frac{5}{8}$ to another?

9. If I sell $\frac{1}{6}$ of a dozen of oranges to one person and $\frac{1}{4}$ of a dozen to another person, what part of a dozen do I sell?

10. What part of an hour is 45 minutes?

11. $\frac{3}{5}$ of an hour is how many minutes?

12. I spent $\frac{1}{6}$ of an hour reading and $\frac{3}{10}$ of an hour writing. What part of an hour did I spend at both?

13. A boy is carrying $6\frac{1}{4}$ lb. of flour, and $6\frac{1}{8}$ lb. of ham. What is the weight of his load?

14. Reduce $\frac{45}{60}$ to lowest terms.

15. 18 hours is what part of a day?

16. Reduce $\frac{18}{24}$ to lowest terms.

ADDITION OF MIXED NUMBERS.

459. Add $12\frac{1}{2}$, $6\frac{2}{3}$, $8\frac{1}{4}$, $15\frac{5}{6}$, $\frac{3}{8}$.

In the fractions $\frac{1}{2}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{6}$, $\frac{3}{8}$, the numbers above the line, 1, 2, 1, 5, 3, are called *numerators;* the numbers below the line, 2, 3, 4, 6, 8, are called *denominators.*

To add fractions, they must have the same denominator. An inspection of the denominators, 2, 3, 4, 6, 8, shows that 48 or 24 will contain each without remainder. 24, which is the smallest number that will contain all, is called the *least common denominator.*

	24
$12\frac{1}{2}$	12
$6\frac{2}{3}$	16
$8\frac{1}{4}$	6
$15\frac{5}{6}$	20
$\frac{3}{8}$	9
$43\frac{5}{8}$	$\frac{63}{24} = 2\frac{15}{24} = 2\frac{5}{8}$. *Ans.* $43\frac{5}{8}$.

Instead of writing the common denominator 24, with each fraction, we may place it above, and write only the new numerators. $\frac{1}{2} = \frac{12}{24}$, $\frac{2}{3} = \frac{16}{24}$, $\frac{1}{4} = \frac{6}{24}$, etc. Write 12, 16, 6, 20, 9. The sum of these fractions is $\frac{63}{24} = 2\frac{15}{24} = 2\frac{5}{8}$. $\frac{5}{8}$ is placed under the fractions to be added, 2 is carried to the whole numbers, making 43.

NOTE. — The fractional parts of answers should be reduced to *lowest terms.*

460. Slate Exercises.

Add:

1.	2.	3.	4.	5.
$23\frac{1}{2}$	$73\frac{1}{4}$	$93\frac{2}{3}$	$11\frac{2}{7}$	$18\frac{1}{3}$
$63\frac{1}{4}$	$8\frac{1}{5}$	$2\frac{1}{6}$	$3\frac{1}{2}$	$7\frac{2}{5}$
$7\frac{2}{5}$	$39\frac{3}{10}$	$74\frac{5}{12}$	$20\frac{3}{14}$	$9\frac{3}{10}$
$3\frac{3}{10}$	$16\frac{1}{2}$	$6\frac{1}{3}$	$5\frac{1}{7}$	$\frac{1}{5}$

6. $12\frac{1}{8} + 3\frac{5}{16} + 27\frac{3}{4} + 8\frac{1}{2}$
7. $19\frac{1}{2} + 7\frac{2}{3} + 34\frac{5}{6} + \frac{1}{8}$
8. $73\frac{3}{4} + 98\frac{1}{6} + \frac{1}{8} + 33\frac{1}{2}$
9. $51\frac{1}{12} + 38\frac{1}{4} + 23\frac{2}{3} + 17\frac{1}{6}$
10. $100\frac{1}{2} + 75\frac{1}{8} + 9\frac{1}{6} + 49\frac{1}{4}$
11. $33\frac{2}{3} + 17\frac{3}{8} + 24\frac{5}{12} + 69\frac{1}{24}$
12. $6\frac{1}{10} + 18\frac{1}{5} + 32\frac{1}{4} + 94\frac{1}{2}$
13. $103\frac{1}{9} + 84\frac{2}{3} + 25\frac{1}{2} + 9\frac{5}{6}$
14. $218\frac{2}{3} + 301\frac{3}{8} + 18\frac{1}{2} + 24\frac{3}{4}$
15. $4444\frac{1}{9} + 518\frac{5}{6} + 37\frac{1}{2} + 95\frac{2}{3}$
16. $93\frac{2}{3} + 127\frac{2}{5} + 18\frac{1}{8} + 509\frac{4}{5}$
17. $8\frac{9}{20} + 64\frac{4}{5} + 126\frac{3}{20} + 1{,}057\frac{1}{4}$
18. $24\frac{1}{2} + 9\frac{3}{4} + 48\frac{5}{12} + 17\frac{1}{6}$
19. $99\frac{1}{2} + 88\frac{3}{10} + 77\frac{3}{4} + 66\frac{4}{5}$
20. $105\frac{5}{18} + 32\frac{2}{9} + 47\frac{1}{6} + 8\frac{1}{3}$

MULTIPLES AND FACTORS.

461. A number that contains another number an exact number of times is a *multiple* of that number.

24 is a multiple of 12; 36, 48, etc., are also multiples of 12.

30 is a multiple of 2, 3, 5, 6, 10, 15.

462. Oral Exercises.

1. 95 is a multiple of what two numbers?
2. Give two factors of 51.
3. What number is a multiple of both 8 and 6?
4. Mention another number that is a multiple of both 8 and 6.
5. Find the smallest number that can be exactly divided by 8 and 12.
6. Give two factors of 91.
7. 57 is a multiple of what two numbers?
8. What is the smallest number that can be exactly divided by 4, 6, and 8.

463. The smallest number that is a multiple of two or more numbers is called the **least common multiple** of such numbers.

9. Find the least common multiple of 5, 10, 15.
10. Find the least common multiple of 2, 7, 14.
11. What part of a dollar is 70 cents?
12. $\frac{3}{8}$ = how many 40ths?
13. Reduce $17\frac{2}{3}$ to thirds.
14. Change $\frac{74}{5}$ to a mixed number.
15. Reduce $\frac{24}{36}$ to lowest terms.
16. What part of a dollar is 15 cents?
17. Add $\frac{1}{3}$ and $\frac{3}{4}$.
18. From $\frac{1}{4}$ take $\frac{1}{5}$.
19. Reduce $\frac{19}{20}$ to 60ths.
20. Which is largest, $\frac{5}{6}$, $\frac{5}{7}$, or $\frac{5}{8}$?
21. $\frac{3}{4}$ of 84 = ?
22. From $\frac{11}{24}$ take $\frac{7}{24}$.
23. From $\frac{9}{14}$ take $\frac{5}{14}$.
24. From $\frac{15}{16}$ take $\frac{9}{16}$.
25. From $\frac{11}{20}$ take $\frac{3}{20}$.

SUBTRACTION OF MIXED NUMBERS.

464. Sight Exercises.

Subtract:

1. $16\frac{11}{12}$	2. $49\frac{19}{20}$	3. $38\frac{23}{24}$	4. $18\frac{8}{15}$	5. $27\frac{9}{10}$
$13\frac{7}{12}$	$37\frac{13}{20}$	$29\frac{11}{24}$	$14\frac{8}{15}$	$16\frac{1}{10}$
6. $28\frac{7}{16}$	7. $47\frac{7}{9}$	8. $36\frac{11}{14}$	9. $25\frac{15}{16}$	10. $32\frac{17}{18}$
$13\frac{5}{16}$	$29\frac{5}{9}$	$18\frac{1}{14}$	$19\frac{11}{16}$	$18\frac{7}{18}$

465. Slate Exercises.

11. $35\frac{3}{4}$	12. $63\frac{1}{2}$	13. $27\frac{3}{8}$	14. $55\frac{5}{6}$	15. $105\frac{3}{10}$
$-8\frac{2}{5}$	$-9\frac{1}{14}$	$-17\frac{1}{8}$	$-25\frac{3}{4}$	$-8\frac{1}{4}$
16. $120\frac{5}{6}$	17. $39\frac{2}{5}$	18. $13\frac{5}{8}$	19. $99\frac{5}{6}$	20. $67\frac{3}{4}$
$-84\frac{7}{9}$	$-38\frac{1}{4}$	$-7\frac{5}{12}$	$-21\frac{4}{9}$	$-59\frac{1}{5}$
21. 480	22. 375	23. 200	24. 873	25. 1,000
$-97\frac{1}{2}$	$-83\frac{1}{4}$	$-90\frac{1}{8}$	$-757\frac{2}{5}$	$-998\frac{5}{6}$
26. 275	27. 676	28. 999	29. 132	30. 23
$-250\frac{3}{7}$	$-76\frac{5}{8}$	$-138\frac{2}{9}$	$-46\frac{3}{10}$	$-18\frac{1}{11}$

466. Oral Exercises.

$1-\frac{1}{2}=?$ $1\frac{1}{4}-\frac{1}{2}=?$ $10-\frac{1}{2}=?$ $10\frac{1}{4}-\frac{1}{2}=?$ $10\frac{1}{4}-1\frac{1}{2}=?$

467. From $197\frac{2}{3}$ take $68\frac{2}{3}$.

	15	
$197\frac{2}{3}$	9	Reduce the fractions to a common denominator (15), as in addition of fractions. $\frac{10}{15}$ being greater than $\frac{9}{15}$, we find the difference between $\frac{10}{15}$ and $1\frac{9}{15}$, or $\frac{24}{15}$. Writing this difference, $\frac{14}{15}$, we add 1 to 68 and subtract.
$68\frac{2}{3}$	10	
$128\frac{14}{15}$	$\frac{14}{15}$	

468. Subtract:

31.	$8\frac{1}{4}$	32.	$23\frac{1}{2}$	33.	$34\frac{1}{8}$	34.	$16\frac{1}{8}$	35.	$21\frac{1}{4}$
	$5\frac{1}{2}$		$5\frac{3}{4}$		$27\frac{2}{8}$		$8\frac{1}{2}$		$9\frac{3}{4}$
36.	$38\frac{1}{3}$	37.	$33\frac{1}{8}$	38.	$77\frac{1}{10}$	39.	$50\frac{1}{5}$	40.	$99\frac{3}{8}$
	$29\frac{1}{3}$		$7\frac{1}{4}$		$59\frac{1}{5}$		$24\frac{1}{2}$		$88\frac{1}{2}$
41.	$100\frac{3}{10}$	42.	$25\frac{3}{10}$	43.	$93\frac{3}{16}$	44.	$101\frac{20}{21}$	45.	$12\frac{2}{3}$
	$76\frac{2}{5}$		$5\frac{1}{2}$		$24\frac{1}{8}$		$98\frac{6}{7}$		$4\frac{3}{8}$
46.	$23\frac{4}{5}$	47.	$9\frac{5}{16}$	48.	$133\frac{3}{4}$	49.	$16\frac{1}{11}$	50.	$37\frac{1}{6}$
	$16\frac{7}{10}$		$3\frac{1}{8}$		$27\frac{7}{16}$		$3\frac{8}{22}$		$29\frac{1}{4}$
51.	$52\frac{3}{8}$	52.	$64\frac{2}{9}$	53.	$125\frac{7}{10}$	54.	$47\frac{1}{9}$	55.	$72\frac{1}{10}$
	$49\frac{5}{6}$		$18\frac{1}{3}$		$100\frac{3}{5}$		$8\frac{5}{6}$		$50\frac{1}{5}$
56.	$31\frac{3}{8}$	57.	$63\frac{1}{9}$	58.	$3\frac{1}{12}$	59.	$25\frac{2}{5}$	60.	$102\frac{5}{12}$
	$27\frac{5}{12}$		$44\frac{1}{6}$		$1\frac{1}{3}$		$17\frac{1}{2}$		$86\frac{1}{2}$

469. Slate Problems.

1. From a piece of cloth containing $17\frac{1}{2}$ yards, $5\frac{3}{4}$ yards and $4\frac{2}{3}$ yards were sold. How many yards were left?

2. A boarding school uses 3 quarts of milk a day for 7 pupils. If there are 77 pupils in the school, how many gallons of milk will be needed per day? Per week?

3. A man pays \$140.40 for 3 pieces of cloth. What is the length of each piece, if the cloth costs \$1.80 per yard?

4. I buy $12\frac{3}{4}$ pounds coffee at 28 cents per pound, and twice as many pounds at 24 cents per pound. If I give the storekeeper \$10, how much change will I receive?

5. A merchant pays \$30 for 65 vases. He sells 17 of them at 40 cents each, 23 at 60 cents each, and receives 48 cents each for the others. What is his profit?

6. Mrs. Jones buys $\frac{1}{2}$ dozen chairs, a bureau for \$17.40, and a mirror for \$13.00. She pays for all \$38.80. What do the chairs cost apiece?

7. In selling 40 yards of velvet that cost me \$1.40 per yard, I gained \$24.00. What did I charge per yard?

8. How much heavier is a cheese weighing $40\frac{5}{8}$ pounds than one which weighs $26\frac{3}{4}$ pounds?

9. A farmer sold $36\frac{1}{2}$ dozen eggs to one storekeeper, $5\frac{3}{8}$ dozen to another, $17\frac{3}{4}$ dozen to a third, $8\frac{5}{6}$ dozen to a fourth, and $11\frac{7}{12}$ dozen to a fifth. How much did he receive for them at 12 cents per dozen?

10. A butcher going to market with \$174.40, bought 15 sheep at \$8 each. If he had had \$25.60 more, he could have bought 4 hogs also. What were the hogs worth apiece?

11. A scholar having to multiply a number by 30, mistook the 3 for a 5, and his answer was 600. What is the correct answer?

12. Forty hats were bought for \$104. At what price apiece should they be sold to make 40 cents on each hat? At what price per dozen?

13. A farmer had 7 bushels of potatoes. He used 2 bushels and 3 pecks for seed. What would the remainder be worth at 20¢ per peck?

14. A butcher buys an ox weighing 1,200 pounds alive, at 6 cents per lb. When killed and dressed, its weight is $\frac{2}{3}$ of the live weight. What is the butcher's profit, if he sells the meat at an average of 15 cents per lb.?

15. The weight of a tub of butter, including the weight of the tub, is $48\frac{1}{4}$ pounds. The tub weighs $9\frac{1}{2}$ lb. What is the butter worth at 24 cents per pound?

16. One boy had 15 marbles, another had 19, a third had 17, a fourth had 13. What was the average number of marbles for each boy?

17. A teacher divided 200 foreign postage stamps among the eight boys of his class. He gave one-fourth of them to the first boy, one-fifth of the remainder to the second boy, and then divided the rest equally among the other six boys. How many did each receive?

18. A merchant sold $17\frac{3}{4}$ yards of muslin, $14\frac{1}{2}$ yards of silk, and as many yards of calico as of the other two together. How many yards did he sell in all?

19. A dealer mixed $2\frac{1}{2}$ pounds of black tea costing 32 cents per pound with $1\frac{1}{2}$ pounds of green tea costing 40 cents per pound. How much per pound does the mixed tea cost him?

20. A man can do $\frac{1}{3}$ of a certain piece of work in a day; another man can do $\frac{1}{6}$ of the same work in a day. What part of the work can both together do in a day? How long would it take both together to finish the work?

470. Slate Exercises.

Find answers:

1. $36 \times 7\frac{1}{6}$	**2.** $124 \times 19\frac{3}{4}$	**3.** $28\frac{1}{2} \times 8$	**4.** $47\frac{1}{8} \times 12$	**5.** $28 \times 4\frac{3}{7}$
6. $93 \times 106\frac{2}{3}$	**7.** $84\frac{3}{4} \times 4$	**8.** $57 \times 3\frac{1}{2}$	**9.** $69 \times 4\frac{1}{4}$	**10.** $81 \times 15\frac{1}{5}$

471. Divide:

11. $93\frac{3}{4} \div 3$	**15.** $80\frac{5}{8} \div 5$	**19.** $825\frac{2}{25} \div 11$
12. $56\frac{4}{5} \div 4$	**16.** $126\frac{7}{18} \div 6$	**20.** $1{,}728\frac{17}{19} \div 12$
13. $98\frac{7}{8} \div 7$	**17.** $450\frac{9}{10} \div 9$	**21.** $2{,}460\frac{10}{11} \div 10$
14. $28\frac{2}{3} \div 2$	**18.** $360\frac{5}{9} \div 8$	**22.** $3{,}926\frac{13}{15} \div 13$

NOTATION AND NUMERATION.

472. The largest number that can be written with six figures is 999,999.

1,000,000 is called one million.

Write in figures two million. Three million. Four million. Six million. Eight million. Ten million.

473. Read the following:

1. 1,234,567	6. 11,034,065	11. 30,100,021
2. 3,000,560	7. 14,602,500	12. 35,000,600
3. 5,009,008	8. 17,386,925	13. 401,023,160
4. 7,090,070	9. 20,007,316	14. 760,030,020
5. 9,843,000	10. 25,000,005	15. 980,750,000

474. Write in figures:

1. Seventy-eight million, one hundred eight thousand, ninety-six.

2. Three million, eight.

3. Fourteen million, seven thousand, five.

4. Nine hundred eighty-seven thousand, six hundred fifty-four.

5. Twenty million, thirty thousand, forty.

6. Three hundred seven million, nine hundred four thousand, six.

7. Nine hundred ninety-nine million, nine hundred ninety-nine thousand, nine hundred ninety-nine.

8. Four hundred seventy-six million, three hundred thousand.

9. Thirty-four thousand, eighteen.

10. Sixty-four million, thirty-two thousand, sixteen.

Add the foregoing.

475. Review. Slate Exercises.

Read the following numbers. Add each column.

1.	2.	3.
27,083,549	508,900,007	243,576,908
116,908,070	63,487,291	36,200,570
3,006,005	4,629,880	5,987,600
20,080,070	25,936,097	380,070
1,647,893	134,870,603	68,000
206,045	59,009,300	593,056
73,000	7,000,004	2,384,672
180,059	686,909	59,876,004
2,316,045	50,308	123,321,123
54,006,000	9,999	88,888,888

476. Add down and across:

1 +	2 +	3 +	4 = ?
20 +	30 +	40 +	50 = ?
300 +	400 +	500 +	600 = ?
4,000 +	3,000 +	2,000 +	1,000 = ?
50,000 +	40,000 +	30,000 +	20,000 = ?
600,000 +	500,000 +	400,000 +	300,000 = ?
7,000,000 +	8,000,000 +	6,000,000 +	5,000,000 = ?
30,000,000 +	40,000,000 +	50,000,000 +	60,000,000 = ?
? +	? +	? +	? = ?

477. Multiply across. Add multipliers and products.

$10 \times 2 = ?$	$12 \times 7 = ?$
$10 \times 5 = ?$	$12 \times 4 = ?$
$10 \times ? = ?$	$12 \times ? = ?$
$25 \times 2 = ?$	$50 \times 4 = ?$
$25 \times 10 = ?$	$50 \times 20 = ?$
$25 \times ? = ?$	$50 \times ? = ?$
$123 \times 3 = ?$	$560 \times 4 = ?$
$123 \times 20 = ?$	$560 \times 50 = ?$
$123 \times 100 = ?$	$560 \times 600 = ?$
$123 \times ? = ?$	$? \times ? = ?$

478. Add:

1.	2.	3.
\$184,635.87½	\$263,005.95	\$5,503.00
25,904.63	38,462.77	45,837.24
8,756.95	159,076.50	24,328.49
889.57	50,318.92	567,849.60
4,326.98¼	36,485.73	20,486.04
58,030.05	9,860.44	54,200.30
209,508.67	76,035.00	2,578.64
37,654.88	8,900.56	328.99
9,876.54¼	4,056.02	3,468.36
63,250.89	26,465.54	87,243.25
6,505.33	7,826.98	28,376.42

4.	5.	6.
184,357,963	34,372,731	42,647
25,083,045	455,228,033	279,306
9,375,087	63,687,279	385,924
873,756	8,694,586	7,825,566
2,095,081	21,321,263	56,638,547
63,407,295	1,585,432	238,673,002
36,215,683	27,271,989	23,512,352
5,088,724	5,648,045	8,790,478
23,565,943	9,185,304	59,408,603
817,004	25,739	193,584,324

7.	8.	9.
84,978,065	347,524,037	87,243,250
418,723,808	14,800,936	403,458,372
56,329,587	48,573,986	32,508,237
3,969,254	4,047,603	6,567,849
8,783,981	850,008	248,604
64,013,899	9,000,560	5,482,325
2,653,802	40,560,275	78,642,833
6,049,380	82,698,863	6,835,409
20,802,028	175,564,276	82,376,358
2,082,885	54,373,438	9,837,458

10. 26,439,827 + 186,754,232 + 57,254,872 + 38,251,243 + 215,823,473 + 25,642,835 + 1,437,268 + 24,674,159 + 2,338,124.

479. Find answers:

11.	$-34,769,875$ $100,231,094$	12.	$653,286,941$ $-37,478,035$
13.	$100,000,000$ $-909,090$	14.	$-13,246,850$ $213,537,090$
15.	$90,000,000$ $-89,750,946$	16.	$70,013,456$ $-69,987,375$
17.	$-247,305,020$ $350,206,019$	18.	$480,615,937$ $-448,955,069$
19.	$-567,386,059$ $650,203,040$	20.	$-123,456,789$ $130,000,000$
21.	$102,030,405$ $-98,765,432$	22.	$300,200,100$ $-246,813,579$

480. United States Civil Service. Railway Mail Service.

1. Add the following:

$\$742,155.74$
429.39
$6,873.68$
397.49
$1,956,374.20$

2. Express in figures one thousand eight hundred eighty-nine.

3. In the fiscal year ended June 30, 1888, the postal clerks employed on railroads traveled 122,031,104 miles, and those employed on steamboats 1,767,649 miles. How many miles more were traveled by railroad than by steamboat?

4. If a railway mail clerk earns $800 in a year, how much will he have left after paying his board at the rate of $16 a month?

5. If a railway mail clerk spends ten cents a day for street-car fare, how much will he spend in six months of 30 days each?

481. Worcester Public Schools. Oral Exercises.

1. How many peaches at 4 cents each can you buy for 27 cents, and how many cents left?

2. If half a yard of cloth is worth $2, what are 5 yards worth?

3. Mary will be 9 years old July 1. In what year was she born?

4. In 4 gallons how many quarts are there?

5. $(6 \times 8) - (5 \times 4) = ?$

6. If half a dozen eggs cost 8 cents, what will 2 dozen cost?

7. $78 - 7 - 9 - 6 - 4 - 10 - 3 - 4 = ?$

8. If 8 apples cost 32 cents, what must I pay for 11 apples?

9. How much will 60 eggs cost at 20 cents per dozen?

10. How many dimes in 3 dollars?

11. $15 + 9 + 6 + 10 + 8 + 3 + 7 + 8 = ?$

12. What will 2 bushels cost, if a peck costs 25 cents?

13. How many inches are there in one yard? In 2 yards?

14. How many school hours in one week?

15. Alice bought a paper of pins for 8 cents, some tape for 6 cents, and an apron for 25 cents. How much change would she receive from 50 cents?

482. Written Exercises.

1. How is division proved?

2. Dictate to be added:

90,015
62,007
8,050
1,001

3. The minuend is 60,341,700; the subtrahend is 47,698,732. What is the remainder? Prove.

4. The divisor is 927; the dividend is 7,995,375; what is the quotient?

5. Multiply the quotient of $(169,668 \div 36)$ by 208.

6. Add seventy-two dollars, eleven cents; fifteen dollars, nine cents; eighty-seven cents; three hundred fifty dollars; and one dollar, four cents.

7. Bought a horse for \$240, a harness for \$62.87, and a robe for \$12. Find cost of all.

8. Which is greater and how much?

$$486 \times 29 \text{ or } 26,845 - 19,976.$$

9. Divide into periods 698706, 4872914, 37694003, 100719400, 2899.

10. What cost 738 carts at \$75 apiece?

11. What is the sum of 236,517, 460,075, 235,300, and 275,161?

12. Write in Roman numerals 1,892, 1,775, and 560.

13. A merchant bought 371 yd. of silk, 287 yd. of broadcloth, 643 yd. of muslin, and 75 yd. of calico. How many yards did he buy in all?

14. From 999,999 take 1,607. Prove.

15. What are the terms of multiplication? Of division?

MULTIPLICATION OF MIXED NUMBERS.

483. Sight Exercises.

Give answers:

1. $\frac{2}{5}$ of 9	5. $\frac{3}{8}$ of 15	9. $\frac{3}{10}$ of 19
2. $\frac{3}{4}$ of 7	6. $\frac{3}{7}$ of 20	10. $\frac{4}{11}$ of 30
3. $\frac{5}{6}$ of 11	7. $\frac{7}{9}$ of 13	11. $\frac{5}{12}$ of 17
4. $\frac{2}{3}$ of 17	8. $\frac{4}{5}$ of 14	12. $\frac{4}{18}$ of 10
13. $9 \times \frac{2}{5}$	17. $15 \times \frac{3}{8}$	21. $19 \times \frac{9}{10}$
14. $7 \times \frac{3}{4}$	18. $20 \times \frac{3}{7}$	22. $23 \times \frac{4}{11}$
15. $11 \times \frac{5}{6}$	19. $13 \times \frac{7}{9}$	23. $17 \times \frac{5}{12}$
16. $17 \times \frac{2}{3}$	20. $14 \times \frac{4}{5}$	24. $10 \times \frac{4}{18}$

484. Slate Exercises.

25. $9 \times 1\frac{2}{5}$	32. $19 \times 8\frac{9}{10}$	39. $16\frac{3}{8} \times 15$
26. $7 \times 2\frac{3}{4}$	33. $23 \times 9\frac{4}{11}$	40. $17\frac{3}{7} \times 20$
27. $11 \times 3\frac{5}{6}$	34. $17 \times 10\frac{5}{12}$	41. $18\frac{7}{9} \times 13$
28. $17 \times 4\frac{3}{8}$	35. $12\frac{2}{5} \times 9$	42. $19\frac{9}{10} \times 19$
29. $15 \times 5\frac{3}{8}$	36. $13\frac{3}{4} \times 7$	43. $20\frac{4}{11} \times 23$
30. $20 \times 6\frac{3}{7}$	37. $14\frac{5}{6} \times 11$	44. $21\frac{5}{12} \times 12$
31. $13 \times 7\frac{7}{9}$	38. $15\frac{3}{8} \times 17$	45. $22\frac{1}{18} \times 14$

46. 387 $\times 400\frac{2}{4}$	49. 698 $\times 35\frac{5}{6}$	52. $31{,}509\frac{4}{5}$ $\times 19$
47. 1,986 $\times 3{,}075\frac{4}{5}$	50. $103\frac{2}{8}$ $\times 275$	53. $2{,}308\frac{3}{7}$ $\times 1{,}560$
48. 2,340 $\times 1{,}607\frac{2}{7}$	51. $4103\frac{3}{4}$ $\times 17$	54. $6{,}089\frac{5}{6}$ $\times 3{,}520$

485. Brooklyn Civil Service. Examination for Patrolmen.

1. Add the following amounts:

Seven hundred thirty-nine dollars and eighty-three cents; five thousand two hundred seventeen dollars and twelve cents; fifty-six dollars and twenty-eight cents; twelve thousand dollars and three cents; and two dollars and eighty-eight cents.

2. Add the following:

46,802
7,605
998
999,777
23
416
3
49
167
2,345
28

3. From seventeen thousand three hundred twelve dollars and six cents subtract thirteen thousand nine hundred six dollars and twenty-eight cents.

4. Multiply 327 by 26.

5. Multiply 32,513 by 654.

6. Divide 6,728 by 9.

7. Divide 12,158,273 by 542.

8. (*a*) Write in words this sum of money: $1,438,704.24.

(*b*) Write in words this number: 67,501.

9. (*a*) How many feet are there in 27 yards?

(*b*) How many pints are there in 53 quarts?

(*c*) How many city lots, each of 25 feet width, would be contained in a block 700 feet long?

486. Examination for Uniformed Firemen.

1. Add these numbers:

1,863	
121	
433	

Also add these numbers:

369,889
233,556
843,772
69,543

2. Subtract 33 from 875. Subtract also 3,689 from 58,429.

3. Multiply 728 by 27.

4. Divide 10,287 by 27.

5. A grocer bought 50 barrels of flour at $6.25 a barrel, and sold them at $7.50 a barrel. How much profit did he make?

487. United States Civil Service. Examination for Post-office Porters.

1. During the fiscal year 1882, mail matter was delivered at free-delivery offices as follows: Mail letters, 298,266,739; mail postal cards, 71,481,742; local letters, 90,002,317; local postal cards, 50,923,724; registered letters, 2,552,894; newspapers, 160,794,706. What was the total number of pieces delivered?

2. During the fiscal year 1881, the expenditures for the postal service were $39,251,736.46, while the total revenues were $36,785,397.97. What was the amount of the deficiency?

3. How much does 57,182 exceed 18,394?

4. The Post-office Department bought 30,106 pounds of twine at 31 cents per pound. What was the cost?

5. The total weight of 175 bags of mail is 13,125 pounds. What is the average weight of each bag?

6. Write 4,617, multiply it by 12, divide the product by 9, add 365 to the quotient, and from the sum subtract 5,521. What is the remainder?

7. Write in figures five thousand one hundred four dollars and two cents.

8. The Post-office Department purchased 420 reams of manilla paper at $1.25 per ream, and 140 reams of note-paper at $1.05 per ream. What was the total cost of the purchase and the average price per ream?

DIVISION OF MIXED NUMBERS.

488. Oral Exercises.

How many times is $\frac{1}{2}$ of a dollar contained in $1? How many times is $\frac{1}{2}$ of a pint contained in 1 pint? $\frac{1}{2}$ of a gallon in 1 gallon?

How many times is $\frac{1}{2}$ of a dollar contained in $2? In $3? In $5?

How many times is $\frac{1}{2}$ of a dollar contained in $1.50? In $2.50? In $3.50? In $4.50?

How many times is 1 half contained in 3 halves? In 5 halves? In 7 halves? In 9 halves?

$\frac{3}{2} \div \frac{1}{2} = ?$ $\frac{5}{2} \div \frac{1}{2} = ?$ $\frac{7}{2} \div \frac{1}{2} = ?$ $\frac{9}{2} \div \frac{1}{2} = ?$

How many times is $\frac{3}{2}$ contained in $\frac{3}{2}$? In $\frac{9}{2}$? In $\frac{15}{2}$? In $\frac{21}{2}$?

Divide $1\frac{1}{2}$ by $1\frac{1}{2}$. $4\frac{1}{2}$ by $1\frac{1}{2}$. $7\frac{1}{2}$ by $1\frac{1}{2}$. $10\frac{1}{2}$ by $1\frac{1}{2}$.

Divide 3 by $1\frac{1}{2}$. 6 by $1\frac{1}{2}$. 9 by $1\frac{1}{2}$. 12 by $1\frac{1}{2}$. 15 by $1\frac{1}{2}$.

Divide 5 by $1\frac{1}{2}$. $6\frac{1}{2}$ by $1\frac{1}{2}$. 10 by $1\frac{1}{2}$. $11\frac{1}{2}$ by $1\frac{1}{2}$. 15 by $1\frac{1}{2}$.

Divide $\frac{3}{4}$ by $\frac{3}{4}$. $\frac{6}{4}$ by $\frac{3}{4}$. $1\frac{1}{4}$ by $\frac{3}{4}$. $1\frac{1}{2}$ by $\frac{3}{4}$. $2\frac{1}{4}$ by $\frac{3}{4}$. 3 by $\frac{3}{4}$. $3\frac{1}{4}$ by $\frac{3}{4}$.

489. Slate Exercises.

Divide 250 by $12\frac{1}{2}$.

$12\frac{1}{2} = 25$ halves.

$250 = 500$ halves.

500 halves $\div$ 25 halves $= 500 \div 25 = 20$, *Ans.*

Divide $1{,}387\frac{1}{2}$ by $18\frac{3}{4}$.

$18\frac{3}{4} = 75$ fourths.

Change $1{,}387\frac{1}{2}$ to fourths by multiplying by 4.

$1{,}387\frac{1}{2} \times 4 = 5{,}550$; that is, $1{,}387\frac{1}{2} = 5{,}550$ fourths.

75 fourths is contained in 5,550 fourths 74 times.

Ans. 74

75)5550

300

00

490. Divide. Prove the correctness of the answer by multiplying the quotient by the divisor.

1. $75 \div 12\frac{1}{2}$
2. $150 \div 12\frac{1}{2}$
3. $75 \div 6\frac{1}{4}$
4. $150 \div 6\frac{1}{4}$
5. $62 \div 15\frac{1}{2}$
6. $105 \div 17\frac{1}{2}$
7. $69 \div 5\frac{3}{4}$
8. $93 \div 7\frac{3}{4}$
9. $100 \div 33\frac{1}{3}$
10. $150 \div 16\frac{2}{3}$

491.

11. $62\frac{1}{2} \div 12\frac{1}{2}$
12. $187\frac{1}{2} \div 12\frac{1}{2}$
13. $81\frac{1}{4} \div 6\frac{1}{4}$
14. $193\frac{3}{4} \div 6\frac{1}{4}$
15. $77\frac{1}{2} \div 15\frac{1}{2}$
16. $192\frac{1}{2} \div 17\frac{1}{2}$
17. $97\frac{3}{4} \div 5\frac{3}{4}$
18. $193\frac{3}{4} \div 7\frac{3}{4}$
19. $166\frac{2}{3} \div 33\frac{1}{3}$
20. $133\frac{1}{3} \div 16\frac{2}{3}$
21. $60 \div \frac{1}{2}$
22. $60 \div 1\frac{1}{2}$
23. $60 \div \frac{1}{3}$
24. $60 \div 1\frac{1}{3}$
25. $60 \div \frac{1}{4}$
26. $60 \div 1\frac{3}{8}$
27. $60 \div \frac{2}{3}$
28. $60 \div 2\frac{1}{2}$
29. $60 \div \frac{3}{4}$
30. $60 \div 3\frac{1}{3}$

492.

31. $60 \div 3\frac{3}{4}$
32. $60 \div 7\frac{1}{2}$
33. $60\frac{3}{4} \div 3$
34. $60\frac{1}{2} \div 2$
35. $62\frac{1}{2} \div 6\frac{1}{4}$
36. $87\frac{1}{2} \div 6\frac{1}{2}$
37. $15\frac{3}{4} \div 1\frac{3}{4}$
38. $24\frac{1}{2} \div 1\frac{3}{4}$
39. $87\frac{1}{2} \div 8\frac{3}{4}$
40. $42\frac{1}{2} \div 4\frac{1}{4}$

493.

41. $75 \div 3\frac{1}{8}$
42. $125 \div 3\frac{1}{8}$
43. $53\frac{1}{8} \div 3\frac{1}{8}$
44. $190\frac{5}{8} \div 3\frac{1}{8}$
45. $100 \div 11\frac{1}{9}$
46. $100 \div 1\frac{1}{9}$
47. $12\frac{1}{2} \div 2\frac{1}{12}$
48. $18\frac{3}{4} \div 2\frac{1}{12}$
49. $33\frac{1}{3} \div 2\frac{1}{12}$
50. $29\frac{1}{6} \div 2\frac{1}{12}$
51. $32\frac{1}{2} \div 3\frac{1}{4}$
52. $50\frac{2}{5} \div 4\frac{1}{5}$
53. $51\frac{3}{8} \div 5\frac{1}{8}$
54. $61\frac{3}{7} \div 6\frac{1}{7}$

FEDERAL MONEY.

494. Slate Exercises.

Add the following without placing the amounts in columns.

1. $8.34, $40.39, $638.27, $594.38, $1.97.
2. $0.03, $8.05, $600.00, $38.72, $198.52, $0.63.
3. $432.84, $96.25, $3.64, $782.46, $800.06, $6.50.
4. $3.60, $40.05, $91.86, $350.48, $84.00, $287.63.
5. $98.27, $0.60, $600.39, $8.09, $37.38, $503.07.
6. $202.97, $42.23, $453.60, $7.18, $63.54, $0.37.
7. $8.43, $0.54, $2.57, $85.13, $425.31, $8.27.
8. $486.54, $84.62, $1.96, $8.13, $35.84, $236.49.
9. $83.61, $523.00, $23.04, $0.86, $35.82, $584.60.
10. $34.80, $93.54, $200.41, $324.86, $50.14, $8.75.

The foregoing examples may be added directly from this book or from the blackboard, the pupils writing on their slates nothing but the answers.

495. Subtract the following without re-arranging them. Find the sum of the minuends, the sum of the subtrahends, and the sum of the remainders.

11.	$1,000.00	− $876.49	=
12.	$549.37	− $99.89	=
13.	$345.93	− $76.04	=
14.	$1,786.08	− $1,097.19	=
15.	$345.00	− $187.23	=
16.	$3,545.37	− $966.38	=
17.	$82.46	− $7.59	=
18.	$5,074.02	− $4,987.63	=
19.	$77.84	− $9.88	=
20.	$4,680.35	− $4,679.46	=
21.	?	− ?	= ?

496. Multiplication.

Find the cost of:

1. 197 barrels of flour, at $5.66 per barrel.
2. 486 bushels of wheat, at $1.04 per bushel.
3. 237 tons of plaster, at $6.72 per ton.
4. 809 tons of hay, at $11.45 per ton.
5. 74 car-loads of bran, at $20.62½ per load.
6. 208 sheep, at $4.65 per head.
7. 673 barrels of mackerel, at $10.60 per barrel.
8. 984 bushels of onions, at $1.09 per bushel.
9. 99 pounds of butter, at 24 cents per pound.
10. 208 pounds of coffee, at 28 cents per pound.

497. What will be the cost of 157 pounds of sugar, at 5¢ per pound.

157
5
785

At 5¢ per pound 157 pounds will cost 157 times 5¢. In practice, however, we multiply 157 by the smaller number 5.

Ans., $7.85.

11. 1,376 yd. of muslin, at $6\frac{3}{4}$¢.
12. 2,084 bu. of corn, at $47\frac{1}{2}$¢.
13. 1,864 lb. of beef, at $5\frac{1}{2}$¢.
14. 988 lb. of turkeys, at $13\frac{1}{2}$¢.
15. 296 bu. of potatoes, at $47\frac{1}{2}$¢.
16. 1,272 lb. of dried apples, at $2\frac{3}{4}$¢.
17. 488 lb. of lard, at $10\frac{7}{8}$¢.
18. 2,240 lb. of sugar, at $4\frac{5}{8}$¢.
19. 5,176 lb. of wool, at $30\frac{3}{4}$¢.
20. 4,892 bu. of wheat, at $99\frac{3}{4}$¢.

498. Elmira, N. Y., Public Schools. Examination Questions.

1. $32{,}765{,}498 \div 7 = ?$
2. $4{,}076 \times 608 = ?$
3. $\$43{,}850 \times 5{,}900 = ?$
4. Find the sum of 496; 384; 572; 675; 765; 259; 847; 921.
5. Find the difference between 80,547 and 160,738.
6. A man had 1,000 acres of land and sold 926 acres. How many acres had he left?
7. $3{,}927{,}015 \div 85 = ?$
8. A merchant has 414 yards of silk. How many dress patterns of 23 yards each will it make?

9. Divide 1,645,368 by 637.

10. At 28 cents a pound, what will 320 pounds of butter cost?

11. Write an analysis of the last example.

12. Write in words the following numbers: $\frac{3}{4}$, $\frac{6}{10}$, $\frac{5}{7}$.

13. From a jug holding 2 gallons of water, 3 quarts were emptied. How many quarts remained?

14. A grocer had three bushels of chestnuts, and sold 25 quarts. How many quarts had he left?

15. At 30 cents a peck, how many pecks of potatoes can be bought for $1.20? Write the analysis.

16. The product of two numbers is 1,134, and one of the numbers is 126. What is the other?

17. A farmer sold 5 pounds of butter at 18 cents a pound, and 6 dozen eggs at 20 cents a dozen. How much did he receive?

18. The divisor is 75, the quotient 657. What is the dividend?

FRACTIONAL PARTS OF A DOLLAR.

499. What will be the cost of 16 base-balls at 25 cents each?

Multiplying 25 cents by 16, we get the answer $4.00. A shorter way is to multiply $\frac{1}{4}$ of a dollar by 16 which gives 16 quarter-dollars, or 4 dollars.

500. Oral Exercises.

At 25 cents per lb., yd., doz., etc., what will be paid for:

1. 32 base-balls?
2. 52 lb. of coffee?
3. 48 straw hats?
4. 84 yd. of ribbon?
5. 36 second readers?
6. 56 vases?
7. 37 doz. lemons?
8. 25 bu. of tomatoes?
9. 41 panes of glass?
10. 33 packages of candy?
11. 49 Roman candles?
12. 60 bars of soap?

501. At 50 cents, give the cost of:

13. 46 lb. of tea.
14. 28 pairs of scissors.
15. 38 penknives.
16. 84 third readers.
17. 44 lb. of candy.
18. 32 caps.
19. 76 grammars.
20. 57 boxes of pens.
21. 49 picture books.
22. 83 dolls.
23. 27 games.
24. 75 feather dusters.

25. What part of a dollar is 75 cents?

26. If I pay 3 quarter-dollars each for sleds, how many quarter-dollars will I pay for a dozen sleds? How many dollars?

502. Give the cost of the following at 75 cents per yd., etc.

27. 16 pairs of skates.
28. 11 yd. of silk.
29. 24 bu. of peaches.
30. 15 gal. of syrup.
31. 9 pairs of gloves.
32. 18 hats.
33. 21 bu. of rye.
34. 22 shad.
35. 13 lb. of tea.
36. 30 gal. of ice-cream.
37. 7 mats.
38. 17 concert tickets.

39. How many cents in one-eighth of a dollar?

40. At one-eighth of a dollar each, what will be the cost of 24 bars soap?

503. Give the cost of the following at $12\frac{1}{2}$ cents per lb., etc.

41. 16 lb. of meat.
42. 48 doz. eggs.
43. 72 qt. of plums.
44. 64 gal. of oil.
45. 80 jars of jelly.
46. 96 cans of condensed milk.
47. 104 yd. of sheeting.
48. 88 lb. of currants.

49. How many cents in one-third of a dollar?

50. At one-third of a dollar each, what will be the cost of a dozen bottles of cologne?

504. Give the cost, at $33\frac{1}{3}$ cents per yd., lb., etc., of:

51. 36 yd. of ribbon.
52. 63 pairs of cuffs.
53. 48 lb. of butter.
54. 27 bu. of oats.
55. 54 pk. of walnuts.
56. 72 doz. oranges.

505. Parts of a Dollar.

$6\frac{1}{4}$ cents $= \frac{1}{16}$ of \$1
$8\frac{1}{3}$ cents $= \frac{1}{12}$ of \$1
$12\frac{1}{2}$ cents $= \frac{1}{8}$ of \$1
$16\frac{2}{3}$ cents $= \frac{1}{6}$ of \$1
25 cents $= \frac{1}{4}$ of \$1
$33\frac{1}{3}$ cents $= \frac{1}{3}$ of \$1
$37\frac{1}{2}$ cents $= \frac{3}{8}$ of \$1
50 cents $= \frac{1}{2}$ of \$1
$62\frac{1}{2}$ cents $= \frac{5}{8}$ of \$1
$66\frac{2}{3}$ cents $= \frac{2}{3}$ of \$1
75 cents $= \frac{3}{4}$ of \$1
$87\frac{1}{2}$ cents $= \frac{7}{8}$ of \$1

506. Oral Exercises.

Give the cost of 72 articles at:

57. $12\frac{1}{2}$ cents each.
58. $37\frac{1}{2}$ cents each.
59. $62\frac{1}{2}$ cents each.
60. $87\frac{1}{2}$ cents each.
61. $33\frac{1}{3}$ cents each.
62. $66\frac{2}{3}$ cents each.
63. $8\frac{1}{3}$ cents each.
64. 25 cents each.
65. 50 cents each.
66. 75 cents each.

507. Multiply:

67. $6\frac{1}{4}$ cents $\times$ 16
68. $8\frac{1}{3}$ cents $\times$ 24
69. $12\frac{1}{2}$ cents $\times$ 88
70. $16\frac{2}{3}$ cents $\times$ 54
71. 25 cents $\times$ 240
72. $33\frac{1}{3}$ cents $\times$ 66
73. $37\frac{1}{2}$ cents $\times$ 48
74. 50 cents $\times$ 186
75. $62\frac{1}{2}$ cents $\times$ 32
76. $66\frac{2}{3}$ cents $\times$ 33
77. 75 cents $\times$ 128
78. $87\frac{1}{2}$ cents $\times$ 88
79. $16\frac{2}{3}$ cents $\times$ 246
80. $33\frac{1}{3}$ cents $\times$ 156

81. $37\frac{1}{2}$ cents $\times$ 80
82. 75 cents $\times$ 160
83. $87\frac{1}{2}$ cents $\times$ 24
84. $62\frac{1}{2}$ cents $\times$ 64
85. $6\frac{1}{4}$ cents $\times$ 160
86. $12\frac{1}{2}$ cents $\times$ 168
87. $\$1.33\frac{1}{3} \times$ 24
88. $\$1.12\frac{1}{2} \times$ 16
89. $\$2.25 \times$ 12
90. $\$3.75 \times$ 12
91. $\$4.37\frac{1}{2} \times$ 8
92. $\$5.16\frac{2}{3} \times$ 6

508. Find the cost of:

93. 86 neckties, at 50 cents each.
94. Six dozen handkerchiefs, at 25 cents apiece.
95. 32 yards of silk, at $\$1.12\frac{1}{2}$ per yard.
96. 64 arithmetics, at 75 cents each.
97. 84 geographies, at $\$1.25$ each.
98. 96 lb. of tea, at 75 cents per pound.
99. 84 pairs of gloves, at $\$1.50$ per pair.
100. 72 yards of cloth, at $\$2.12\frac{1}{2}$ per yard.

509. Blackboard Exercises.

Write answers.

Do not write quantities or prices on the slate.

1. 687 pounds, at 4¢.
2. 976 yards, at 6¢.
3. 2,504 dolls, at 25¢.
4. 352 yards, at $12\frac{1}{2}$¢.
5. 1,728 hats, at 50¢.
6. 933 yards, at $33\frac{1}{3}$¢.
7. 938 coats, at $\$7$.
8. 695 pounds, at 20¢.
9. 248 pounds, at 75¢.
10. 186 pounds, at $66\frac{2}{3}$¢.
11. 12 bushels, at $\$1.43$.
12. 9 tons, at $\$22.75$.
13. 8 barrels, at $\$16.37\frac{1}{2}$.
14. 11 sheep, at $\$7.47$.

15. 16 gallons, at $3.62½.
16. 13 sacks of salt, at $1.11.
17. 124 bushels, at $1.50.
18. 96 pounds, at $1.25.
19. 120 gallons, at $2.33⅓.
20. 64 sacks, at $1.12½.

510. Oral Exercises.

At 50 cents each, how many penknives can be bought for $1? For $2? For $3? For $10? For $20?

At 25 cents each, how many readers can be bought for $1? For $2? For $3? For $10? For $20?

At 12½ cents per yard, how many yards can be bought for $1? For $2? For $3? For $10? For $20?

At 33⅓ cents per pound, how many pounds can be bought for $1? For $2? For $3? For $10? For $20?

511. Oral.

At 25 cents each:

1. How many base-balls can be bought for $9?
2. Straw hats, for $12?
3. Roman candles, for $18?
4. Readers, for $15?
5. Vases, for $21?
6. Bars of soap, for $3¼?
7. Packages of candy, for $4½?
8. Yards of ribbon, for $5.75?
9. Bushels of tomatoes, for $10.50?
10. Pounds of coffee, for $12.75?

512. At 50 cents:

11. Pounds of tea, for $43?
12. Penknives, for $20.50?
13. Pounds of candy, for $94?
14. Third readers, for $17.50?

15. Caps, for $21?
16. Grammars, for $37?
17. Boxes of pens, for $72?
18. Dolls, for $64?
19. Pairs of scissors, for $19?
20. Feather dusters, for $26.50?

513. At $12\frac{1}{2}$ cents:

21. Gallons of oil, for $8?
22. Dozen of eggs, for $11?
23. Pounds of meat, for $21?
24. Quarts of plums, for $1\frac{1}{8}$?
25. Jars of jelly, for $\$\frac{3}{4}$?
26. Yards of sheeting, for $1\frac{1}{2}$?
27. Cans of milk, for $2\frac{1}{4}$?
28. Pounds of currants, for $3.12\frac{1}{2}$?
29. Whisk brooms, for $4.37\frac{1}{2}$?
30. Collars for $5.62\frac{1}{2}$?

514. At $33\frac{1}{3}$ cents:

31. Yards of ribbon, for $6?
32. Pairs of cuffs, for $12?
33. Pounds of butter, for $18?
34. Bushels of oats, for $32?
35. Pecks of walnuts, for $1\frac{1}{3}$?
36. Dozen of oranges, for $1\frac{2}{3}$?
37. Straw hats, for $2.33\frac{1}{3}$?
38. Dolls, for $3.66\frac{2}{3}$?
39. Penknives, for $4.33\frac{1}{3}$?
40. Pounds of candy, for $5.66\frac{2}{3}$?

515. At $16\frac{2}{3}$ cents:

41. Collars, for \$4?
42. Pounds, for \$21?
43. Yards, for $\$\frac{1}{3}$?
44. Ounces, for $\$\frac{1}{2}$?
45. Packages, for $66\frac{2}{3}$ cents?
46. Quarts, for $\$1.16\frac{2}{3}$?
47. Gallons, for \$1.50?
48. Pecks, for $\$2\frac{2}{3}$?
49. Feet, for $\$3.33\frac{1}{3}$?
50. Yards, for $\$4.66\frac{2}{3}$?

516. Blackboard Exercises.

Divide at sight:

51. \$24.50 by 50 cents.
52. \$12.25 by 25 cents.
53. \$26 by $33\frac{1}{3}$ cents.
54. \$14.50 by $12\frac{1}{2}$ cents.
55. \$17 by $16\frac{2}{3}$ cents.
56. \$18.75 by 25 cents.
57. $\$11.87\frac{1}{2}$ by $12\frac{1}{2}$ cents.
58. $\$13.33\frac{1}{3}$ by $33\frac{1}{3}$ cents.
59. \$37.50 by 50 cents.
60. $\$13.33\frac{1}{3}$ by $16\frac{2}{3}$ cents.

DIVISION OF FEDERAL MONEY.

517. Oral Exercises.

How often is 1 quart contained in 1 gallon? 1 pt. in 1 qt.? 2 qt. in 1 gal.? 1 inch in 1 foot? 2 in. in 1 ft.? 3 in. in 1 ft.? 4 in. in 1 ft.? 6 in. in 1 ft.? 6 in. in 2 ft.? 8 in. in 2 ft.? 1 ounce in 1 pound? 1 oz. in 2 lb.? 4 oz. in 2 lb.? 1 fourth in 1 half? 1 third in 1?

How often is 1 cent contained in \$1? 2 cents in a dollar? 4 cents in 2 dollars? 25 cents in 25 dollars?

518. Give answers at sight:

1. $\$4 \div 10¢$
2. $\$5 \div 5¢$
3. $\$12 \div 4¢$
4. $\$36 \div 6¢$
5. $\$63 \div 3¢$
6. $\$7 \div 25¢$
7. $\$20 \div 33\frac{1}{3}¢$
8. $\$36 \div 3¢$

9. $\$40 \div 50¢$
10. $\$9 \div 10¢$
11. $\$1 \div \frac{1}{2}¢$
12. $\$3 \div \$\frac{1}{4}$
13. $\$84 \div 50¢$
14. $\$1 \div 16\frac{2}{3}¢$
15. $\$16 \div 16¢$
16. $\$16 \div 16\frac{2}{3}¢$
17. $\$16 \div 33\frac{1}{3}¢$
18. $\$16 \div 25¢$
19. $\$16 \div 50¢$
20. $\$12 \div 20¢$

519. At 36 cents each, how many spellers can be bought for $27?

$$\begin{array}{r} 75 \\ 36\overline{)2700} \\ \underline{180} \\ 0 \end{array}$$

$27 = 2,700 cents. Since 1 speller costs 36 cents, for 2,700 cents we can buy $\frac{2700}{36}$ spellers. *Ans.* 75 spellers.

520. Slate Problems.

1. At $2.75 per day, how long will it take a man to earn $110?

$$11{,}000 \div 275$$

2. How many yards of muslin, at 12 cents per yard, can be bought for $126?

3. A farmer spent $140 for sheep at $5.60 each. How many did he buy?

4. A grocer pays $74.50 for tea at $\frac{1}{2}$ of a dollar per pound. What is the weight of the tea?

5. When rye is worth 87 cents per bushel, how many bushels can be purchased for $261?

6. At $12\frac{1}{2}$ cents per pound, how many pounds of meat will cost $175.25?

7. If 75 spellers cost $27, what is the price of 1 speller?

8. A woman paid $24 for 36 yards of dress goods. What did she pay per yard?

9. At 6 for a dollar, how many rabbits can be bought for $87?

10. The cost of 13 houses was $36,887.50. What was the price of each?

11. One-fourth of a vessel is worth $2,789.75. What is the value of the vessel?

12. If it takes 20 minutes to shoe a horse, how many horses can a blacksmith shoe in a day of 8 hours?

13. How many bars of soap, each weighing 12 oz., will be contained in 10 boxes of 75 lb. each?

521. Sight Exercises. Approximate Answers.

1. What will be the cost of $39\frac{7}{8}$ lb. butter at 20¢ per lb.?
(Nearly 40 lb. at 20¢. The cost is nearly what?)

2. A man has 4,200 pounds of flour which he wishes to put into barrels containing 196 lb. each. About how many barrels will he need?
(Each barrel contains nearly how many pounds?)

3. A merchant bought a hogshead of molasses, containing $47\frac{3}{4}$ gallons, at 50 cents per gallon. About how much did it cost?

4. How many lots at $1,975 each can be bought for $12,000?

5. Sold 3 pieces of cloth, 33 yd. to the piece, at $1.95 per yd. Give the approximate amount of the bill.

6. $28\frac{15}{16} + 37\frac{19}{20}$ = nearly what?

7. $175\frac{1}{8} \div 24\frac{9}{10}$ = nearly what?

8. $18\frac{4}{5} \times 9\frac{7}{8}$ = nearly what?

9. $87\frac{1}{16} - 49\frac{18}{19}$ = nearly what?

10. $4\frac{7}{8} \times 4\frac{4}{5} \times 4\frac{9}{10}$ = nearly what?

522. Philadelphia Public Schools. — Oral Work.

1. From 60 take 24. Find $\frac{1}{4}$ of the remainder.

2. Multiply 15 by 5. Take 18 from the product.

3. How many 9's in 3 times 21?

4. 12 times 6 are how many times 8?

5. To 9 times 7 add 10. Take 15 from the sum.

6. $\frac{3}{4}$ of 100 rods = ?

7. ($\frac{3}{5}$ of 60) $\div$ 9 = ?

8. 12 times 12 men = ?

9. A half-dollar and a quarter-dollar = cents?

10. 98 $\div$ 9 = ?

11. $\frac{3}{4}$ of a yard and 12 inches = inches?

12. One can has in it 4 gallons of milk, and another has in it 6 quarts. How many pints are in both?

13. What do you mean by $\frac{1}{2}$ of anything?

14. Divide a circle into eight equal parts.
Draw heavy lines to show three of these parts.
What fractional part of the circle have you enclosed by these lines?

15. If one-half a pound of soap costs 10 cents, what will three pounds cost?

523. Written Work.

1. Write in figures: Nine thousand eleven, seventy thousand forty-four, five hundred thousand four hundred ten, fifty-four thousand twenty-one.

2. Multiply \$40.25 by 96.

3. Add 75,896; 867; 5,875; 89; 7,849; and 645,978.

4. From \$300,000 take \$7050.75.

5. Divide 700,610 by 765.

6. How many days will 36 bushels of oats last 12 horses, if each horse eats 6 quarts a day?

7. If a barrel of flour is worth $4.50, how many barrels can be bought for $441? How much will all the flour weigh if each barrel holds 196 pounds?

8. Suppose your slate is 12 inches long, 9 inches wide, and 15 inches across diagonally. How long a string is needed to go around the outside and along the diagonal? Make a diagram to explain your work.

524. Questions from U. S. Civil Service Examinations.

1. The total cost of the Union Pacific railroad, which is 1,819 miles long, was $157,092,858. What was the average cost per mile?

2. How many pieces of second-class matter (newspapers) are there in 644 pounds, each piece weighing 8 ounces?

3. The postmaster at Norwich made requisition for the following postage stamps: 27 sheets of 1-cent, 97 sheets of 2-cent, 35 sheets of 5-cent, and 17 sheets of 10-cent stamps. What was the money value of these stamps, there being 100 stamps in each sheet?

4. If a clerk earns $3.75 each day, how much will he earn in 101 days?

5. An officer who was paid $3.50 a day, stayed in the service until he had earned $143.50. How many days had he worked?

6. A cargo of potatoes was discharged in tubs containing 250 pounds each, which were filled 1,785 times. The bushel of potatoes is estimated at 80 pounds. How many bushels were landed?

7. What is the total quantity of molasses in 4 casks containing respectively $40\frac{1}{4}$, $25\frac{1}{8}$, $27\frac{3}{16}$, and $55\frac{1}{2}$ gallons?

8. During the fiscal year 1884, the exportation of cotton from certain American ports was as follows: New Orleans, 703,698,018 pounds; Baltimore, 84,620,654 pounds; New York, 278,358,580 pounds; Yorktown, 11,208,246 pounds; Galveston, 190,574,067 pounds. What was the total number of pounds exported from the ports named?

9. The number of yards of cotton cloth produced in the United States in 1860 was 1,148,252,406, and in 1880, 2,273,278,025. By how many yards did the production of 1880 exceed that of 1860?

10. How long will it take 50 clerks to count $1,500,000 in silver coin, one-half of which is in half-dollars and the other half in quarter-dollars, each clerk counting at the rate of fifty pieces a minute? Express the answer in hours.

11. Write in figures one million one thousand one dollars and one cent.

12. Multiply 657,934 by 3,209.

13. The whole number of pieces of mail matter handled at 212 post-offices was 2,164,517,880. What was the average number of pieces for each office?

14. The War Department expended $1,765.25 for mucilage at $5.75 a dozen quarts. How many quarts were purchased?

15. The Post-Office Department bought 6,670 pounds of twine at 19½ cents a pound; 372 pounds of sponge at 65½ cents a pound, and 40½ dozen of ink at $2.50 a dozen. What was the total cost of the purchase?

525. Learn the following tables:

TIME.

60 seconds (sec.)	1 minute (min.)
60 minutes	1 hour (hr.)
24 hours	1 day (da.)
7 days	1 week (wk.)

DRY MEASURE.

2 pints (pt.)	1 quart (qt.)
8 quarts	1 peck (pk.)
4 pecks	1 bushel (bu.)

AVOIRDUPOIS WEIGHT.

16 ounces (oz.)	1 pound (lb.)
2000 pounds	1 ton (T.)

The hundredweight (100 pounds) is written cwt.

LIQUID MEASURE.

2 pints (pt.)	1 quart (qt.)
4 quarts	1 gallon (gal.)

A gill (gi.) is equal to one-fourth of a pint. It is very rarely used.

DENOMINATE NUMBERS.

526. Slate Exercises.

1. How many hours in $7\frac{1}{2}$ days?

2. How many hours in 7 days 12 hours?

3. How many seconds in 2 hours?

4. A man buys 12 bu. and 3 pk. apples @ \$1 per bu. What is the cost?

5. What will be the cost of 3 pk. 7 qt. chestnuts @ 8¢ per qt.?

6. How many pints are there in 5 gallons of ice cream?

7. How many half-pints are there in 10 gallons of ice cream?

8. How many 4-ounce packages can be made from 5 pounds of pepper?

9. A boy pays \$1.50 for 1 gallon and 2 quarts of ice cream. What is the price per quart?

10. How many gallons of lemonade will be needed to give 96 people $\frac{1}{2}$ pt. each?

11. How many seconds in 5 hours?

12. How many minutes in 1 week?

13. Change 13 hours and 20 minutes to minutes.

14. Change 15 bu. and 4 pk. to pecks. To quarts.

15. How many ounces in 47 lb. 5 oz.?

16. How many pounds and ounces in 237 ounces?

17. Change 1,494 minutes to hours and minutes.

18. Find the number of hours in 6 weeks.

19. How many hours are there in January?

20. How many inches are there in 2 yd. 2 ft. and 2 in.?

21. How many ounces in 4 tons?

22. Reduce 5 cwt. and 80 lb. to oz.

23. How many pounds in $\frac{3}{8}$ of a ton?

24. In $\frac{3}{4}$ of a ton how many cwt.?

25. What will 400 lb. of coal cost at $5 per T.?

26. What fraction of a ton is 1,500 lb.?

27. How many days and hours in $\frac{2}{3}$ of a week?

28. Find the number of yards in 3 pieces of cloth averaging 16 yd. 2 ft. each.

29. When coal is $5.50 per ton, how much will I have to pay for 3,000 pounds?

30. A store-keeper charged 70 cents for a roll of butter weighing 2 lb. 3 oz. What was the price per ounce? What was the price per pound?

31. Change 60 lb. to the fraction of a hundredweight.

32. How many pints are there in a barrel of oil that contains $43\frac{1}{2}$ gallons?

527. Brooklyn Civil Service. Examination for Plumbers.

1. Add:

	27
	1,484
	593

2. (*a*) From 57,493
   Subtract 18,627

   (*b*) From 225,903
   Subtract 46,107

3. Add these amounts:

6,201
27
14,333
788
271,553

4. Multiply: (*a*) 56 by 702
   Multiply: (*b*) 664 by 37

5. Divide: (*a*) 2,438 by 16
   Divide: (*b*) 57,313 by 822

6. Write out in words the numbers expressed by the figures 925,415.

7. Write out in figures the following amount: One million six thousand one hundred thirteen dollars and fifty-nine cents.

8. (*a*) How many inches are contained in one and a half feet?

   (*b*) How many pounds in a ton?

   (*c*) How many days in the aggregate are contained in seven and five-sevenths weeks?

SPECIAL DRILLS.

528. Give sums:

$56 + 25$	$21 + 32 + 43$	$750 + 190$	$225 + 54$
$47 + 47$	$30 + 20 + 18$	$390 + 120$	$315 + 21$
$22 + 68$	$40 + 13 + 26$	$480 + 150$	$437 + 60$
$39 + 31$	$24 + 31 + 30$	$620 + 180$	$540 + 55$

529. Give remainders:

$81 - 56$	$750 - 190$	$750 - 560$	$279 - 54$
$94 - 47$	$510 - 120$	$510 - 390$	$386 - 63$
$60 - 28$	$630 - 150$	$630 - 480$	$457 - 37$
$72 - 39$	$820 - 160$	$820 - 660$	$568 - 25$

530. Give products:

310×9	99×2	26×7	18×25
420×4	65×3	24×8	16×25
630×3	49×4	22×9	13×25
740×2	37×5	18×11	11×25

531. Give quotients:

$196 \div 4$	$196 \div 49$	$450 \div 25$	$2{,}790 \div 9$
$190 \div 5$	$190 \div 38$	$375 \div 25$	$1{,}680 \div 4$
$192 \div 6$	$192 \div 32$	$225 \div 25$	$1{,}890 \div 3$
$196 \div 7$	$196 \div 28$	$350 \div 25$	$1{,}480 \div 2$

532. Give answers:

$2\frac{1}{2} + 1\frac{1}{3}$	$1\frac{1}{3} - \frac{1}{2}$	$\frac{2}{3}$ of 66	$12\frac{1}{2} \div \frac{1}{2}$
$2\frac{1}{4} + 1\frac{1}{3}$	$2\frac{1}{4} - 1\frac{1}{3}$	$84 \times \frac{3}{4}$	$8\frac{1}{4} \div \frac{3}{4}$
$2\frac{1}{6} + 1\frac{1}{2}$	$3\frac{1}{3} - 2\frac{1}{2}$	$\frac{4}{5}$ of 100	$5\frac{1}{3} \div \frac{2}{3}$
$2\frac{1}{6} + 1\frac{1}{3}$	$4\frac{1}{6} - 3\frac{1}{3}$	$186 \times \frac{5}{6}$	$3\frac{1}{6} \div \frac{4}{5}$

533. Oral Problems.

1. Paid 59¢ for muslin and 25¢ for trimming. How much was paid in all?

2. A boy had 75¢. How much had he after spending 25¢ for a knife and 15¢ for a ball?

3. If 8 lb. of raisins cost $1.04, what is the price per pound?

4. At $1.89 per yard of silk, what will be the cost of 1 foot?

5. If 32 lb. of flour cost 96 cents, how many pounds can be bought for 60 cents?

6. One girl has 16 cents, another has 24 cents, a third has 8 cents. How many dolls at 16 cents each can be bought with their money?

7. What will be the weight of 3 bushels corn, weighing 56 pounds per bushel?

8. How many ounces in 9 pounds?

9. How many pounds in 8 packages, each weighing 10 ounces?

10. Find the cost of 3 lb. and 2 oz. of butter at 32 cents per lb.

11. Bought 4 pounds of 6-cent sugar and a pound of butter at 36 cents. How much change from $1?

12. Four boys have 144 marbles among them. If they were equally divided, how many would each have?

13. A man earns $100 per month, and spends $76. How much does he save?

14. If a man saves $32 per month, how many months will it take him to save $960?

15. Paid $27.90 for 9 jackets. What did they cost apiece?

16. Mr. B's farm contains 520 acres. How many acres will he have left after selling 180 acres?

17. William's kite string is 435 yards long, John's is 62 yards longer. What is the length of John's string?

18. A farmer raised 168 bushels of grain. He sold $\frac{1}{8}$ of it. How many bushels did he sell?

19. $6\frac{1}{4}$ yards of ribbon are cut into pieces a quarter of a yard long. How many pieces are there?

20. If it takes $18\frac{3}{4}$ yards of cloth to make 3 suits, how many yards does it take for 1 suit?

21. James has 150 marbles, Thomas has $\frac{2}{5}$ as many. How many marbles have both?

22. A newsdealer received $6.36 for papers sold at 3 cents each. How many papers did he sell?

23. If it takes $4\frac{1}{2}$ days for one man to do a piece of work, how long will it take 2 men to do the same work?

24. A farm is divided into 4 fields, each containing 49 acres. How many acres are there in the farm?

25. From a piece of cloth containing $10\frac{1}{2}$ yards, $5\frac{3}{4}$ yards are sold. How many yards are left?

26. Find the cost of 28 lb. coffee at 25¢ per lb.

27. How much does a farmer receive for 28 cows which he sells at $25 each?

28. Find the number of hours in a week.

29. How many pieces, each three-quarters of a yard long, can be cut from six yards of wire?

30. 3,600 seconds are equal to how many minutes?

31. If 25 yards of material are needed for a dress, how many yards will be required for 33 dresses?

32. At 7 for a cent what will 98 marbles cost?

534. Sight Exercises.

Divide:

1.	$960 \div 240$	**6.**	$8{,}400 \div 2{,}100$	**11.**	$10{,}800 \div 1{,}200$
2.	$780 \div 260$	**7.**	$8{,}600 \div 4{,}300$	**12.**	$10{,}400 \div 1{,}300$
3.	$960 \div 480$	**8.**	$8{,}800 \div 2{,}200$	**13.**	$6{,}000 \div 1{,}500$
4.	$720 \div 180$	**9.**	$9{,}600 \div 3{,}200$	**14.**	$5{,}700 \div 1{,}900$
5.	$1{,}170 \div 130$	**10.**	$9{,}900 \div 3{,}300$	**15.**	$12{,}000 \div 2{,}400$

535. Give answers in whole numbers. (Omit remainders.)

16.	$960 \div 241$	**21.**	$8{,}400 \div 2{,}110$	**26.**	$10{,}800 \div 1{,}205$
17.	$779 \div 260$	**22.**	$8{,}500 \div 4{,}300$	**27.**	$10{,}300 \div 1{,}300$
18.	$959 \div 480$	**23.**	$8{,}800 \div 2{,}199$	**28.**	$6{,}100 \div 1{,}550$
19.	$720 \div 181$	**24.**	$9{,}599 \div 3{,}199$	**29.**	$5{,}700 \div 1{,}899$
20.	$1{,}030 \div 130$	**25.**	$10{,}000 \div 3{,}330$	**30.**	$12{,}020 \div 2{,}410$

536. Multiply:

31.	$1{,}200 \times 6$	**36.**	$1{,}300 \times 9$	**41.**	$2{,}100 \times 4$	**46.**	$1{,}400 \times 8$
32.	$1{,}800 \times 4$	**37.**	$2{,}300 \times 3$	**42.**	$1{,}400 \times 6$	**47.**	$2{,}400 \times 4$
33.	$2{,}500 \times 3$	**38.**	$3{,}200 \times 2$	**43.**	$4{,}100 \times 2$	**48.**	$1{,}300 \times 7$
34.	$1{,}700 \times 5$	**39.**	$1{,}500 \times 4$	**44.**	$1{,}600 \times 5$	**49.**	$1{,}200 \times 9$
35.	$1{,}400 \times 7$	**40.**	$1{,}200 \times 8$	**45.**	$2{,}200 \times 3$	**50.**	$6{,}300 \times 2$

537. Perform indicated operations:

51.	$18 + (30 \times 4)$	**57.**	$\frac{1}{2}$ of $(240 + 60)$
52.	$7 + (2 \times 8) - 4$	**58.**	$(7 + 2) \times (8 - 4)$
53.	$[(7 + 2) \times 8] - 4$	**59.**	$7 + [2 \times (8 - 4)]$
54.	$1 - (\frac{1}{2} + \frac{1}{8})$	**60.**	$1 - \frac{1}{2} + \frac{1}{8}$
55.	$(6 \times \frac{1}{2}) + \frac{1}{8}$	**61.**	$6 \times (\frac{1}{2} + \frac{1}{8})$
56.	$\frac{1}{2}$ of $\frac{1}{8}$ of 600	**62.**	$\frac{3}{4} \times 12 \times \frac{2}{3}$.

538. Place the following upon the board. The pupils will write the answers and nothing else. (Art. 385.)

63. $\frac{582}{97}$	**67.** $\frac{209}{29}$	**71.** $\frac{907}{93}$	**75.** $\frac{524}{76}$	**79.** $\frac{377}{85}$
64. $\frac{617}{77}$	**68.** $\frac{374}{45}$	**72.** $\frac{470}{67}$	**76.** $\frac{430}{86}$	**80.** $\frac{295}{66}$
65. $\frac{299}{36}$	**69.** $\frac{532}{87}$	**73.** $\frac{260}{55}$	**77.** $\frac{310}{54}$	**81.** $\frac{876}{95}$
66. $\frac{458}{57}$	**70.** $\frac{292}{56}$	**74.** $\frac{400}{77}$	**78.** $\frac{865}{94}$	**82.** $\frac{573}{74}$

539. Slate Exercises. Review.

Add:

1.	**2.**	**3.**
$3,947.25	$14.92	$1,094.07
14,816.00	3,120.50	789.14
956.83	18.72	9,870.00
2,469.98	79,841.24	4,009.89
95,783.04	3,972.87	484.78
9,005.79	104.99	9,741.96
6,598.86	19.90	419.74
1.58	19,877.46	4.58
39.99	387.24	999.10
463.27	91.85	23.46
.85	901.09	.98

4.	**5.**	**6.**
$18,477.09	$46.89	$48.34
494.78	.27	875.39
1,489.07	3,538.39	82.76
104.84	468.43	9.87
91.03	56.19	53.49
20,999.99	3.87	835.47
7,583.94	786.49	3,457.96
87.62	5,898.39	85,473.89
3.47	65.40	4,938.78
6,952.83	808.34	453.48

540. Supply missing numbers:

7.	8.	9.
9,256,874	348	7,293
863,052	2,967	82,538
24,635,998	36,847	786,324
7,007,007	243,837	?
?	3,096,846	94,649
85,386,950	?	1,009,765
6,875,634	183,634	256,834
3,987,456	986,246	3,983,387
35,068	8,216	54,619
705	586,237	760,888
139,049,086	6,000,000	10,685,391

10.	11.	12.
3,157,842	749,309	8,352,465
?	980	37,947
1,308,215	9,876,543	40,897,654
930,084	1,234,567	390,784
17,521,938	468,208	?
743,150	63,593,065	1,246,937
9,807	82,389,659	4,373,539
420,985	1,293,714	351,236
73,612	460,045	9,764,318
9,708	?	665,524
65	15,813,477	74,638
35,986,210	253,352,532	100,001,010

541. Multiply:

13. $9{,}207 \times 3{,}014$

14. $35{,}482 \times 798\frac{2}{3}$

15. $5{,}290 \times 6{,}075$

16. $9{,}204 \times 678\frac{7}{8}$

17. $75{,}074 \times 395$

18. $68{,}431 \times 924\frac{4}{5}$

19. $95 \times 95 \times 95$

20. $185 \times 19 \times 78$

21. $87\frac{1}{4} \times 23 \times 36$

22. $706 \times 304 \times 509$

23. $48\frac{2}{3} \times 32 \times 74$

24. $538 \times 247 \times 125$

542. Divide:

25.	34,463 ÷ 370	31.	68,703,705 ÷ 12,345
26.	2,823,150 ÷ 1,298	32.	861,420,135 ÷ 56,789
27.	639,712 ÷ 624	33.	70,370,088 ÷ 25,986
28.	21,345,738 ÷ 72,100	34.	4,510,940 ÷ 4,900
29.	1,861,704 ÷ 3,510	35.	34,639,215 ÷ 39,783
30.	20,857,384 ÷ 3,004	36.	12,345,678 ÷ 57,095

543. Slate Problems.

1. The sum of three numbers is 150. Two of the numbers are 68 and 43. What is the third?

$$68 + 43 + ? = 150$$

2. The divisor is 24; the dividend is 264. Find the quotient

3. The product is 228; the multiplicand is 19. What is the multiplier?

$$19 \times ? = 228$$

4. The minuend is 175; the subtrahend is 87. What is the remainder?

5. The remainder is 92; the subtrahend is 89. Find the minuend.

$$? - 89 = 92$$

6. The minuend is 176, and the remainder is 99. What is the subtrahend?

7. The multiplier is 15; the multiplicand is 46. What is the product?

8. The multiplier is 16; the product is 272. What is the multiplicand?

9. The dividend is 300; the divisor is 17. Find the remainder.

10. The quotient is 15; the remainder is 3; the divisor is 8. What is the dividend?

$$8)\ ?$$
$$15\tfrac{3}{8}$$

11. The dividend is 273; the quotient is 21. What is the divisor?

$$?)\overline{273}\quad 21$$

12. The dividend is 267; the quotient is 13; the remainder is 7. What is the divisor?

$$?)\overline{267}\quad 13\tfrac{7}{?}$$

544. Oral Problems.

1. What will be the cost of 8 pounds of meat at 15 cents per pound?

2. Paid $12.90 for 3 pieces of lace. How much did each cost?

3. Gave $1 in payment for a 25-cent ball, and 4 ten-cent bats. How much change did I receive?

4. If 3 straw hats cost 63 cents, what will be the cost of 5?

5. At the rate of 3 oranges for 5 cents, what will be the cost of a dozen oranges?

6. A gross is 12 dozen. How many pens in $\frac{1}{3}$ gross?

7. How many inches in 4 yards?

8. How many ounces in $6\frac{1}{2}$ pounds?

9. At 5 cents per pint, how much would be paid for a bushel of chestnuts?

10. A person used 2 gal. and 3 qt. of milk in one week, and 3 gal. and 1 qt. the next week. How many gallons are used in the two weeks?

11. I sold $3\frac{1}{2}$ yards of silk and $2\frac{3}{4}$ yards of velvet. How many yards in all did I sell?

12. A man had $6\frac{1}{4}$ dollars, and he spent $3\frac{1}{2}$. How much money had he left?

545. Slate Problems.

1. A man works 9 months, 26 days per month, and receives $702. What are his daily wages?

2. A merchant buys 136 vases for $272. If 36 are broken, how much must he charge apiece for the others to gain $28 on all?

3. On Monday, the receipts of a store are $180; on Tuesday, $30 less; on Wednesday, $110 less than the total of Monday and Tuesday. What are the receipts for the three days?

4. The yearly rent of a house is $480. What is the rent for 2 years 4 months?

5. A mechanic works 300 days per year, at $4 per day. If his daily expenses for 365 days average $3, how much money does he save each year?

6. A woman pays $5.20 for 3 lb. of tea and 56 lb. of sugar. What is the price per lb. of the sugar, if the tea costs 80¢ per lb.?

7. A man had $7,500. He paid $\frac{2}{5}$ of it for a house, $575.60 for repairs, and $387.75 for furniture. How much money had he left?

8. How much hay will be required to feed 18 horses a year of 366 days, if each horse receives 15 pounds a day?

9. A person pays a debt of $576, giving 40 ten-dollar bills, 30 two-dollar bills, 6 one-dollar bills, and the remainder in five-dollar bills. How many of the last did he give?

10. A drover buys 64 sheep for $400. He sells $\frac{1}{2}$ of them at $7 each, and the remainder at $8 each. What is his profit?

11. A merchant sells 56 yards of cloth for $84, gaining $14. What did it cost him per yard?

12. A package of coffee, costing 60 cents, was sold for 75 cents, the profit on each pound being 5 cents. What was the selling price per pound?

13. How many yards of cloth, at $1.75 per yard, can be bought for $105?

14. A tailor buys a piece of cloth for $50. From it he makes 4 pairs of trousers, which he sells at $7 per pair, and 4 coats, for each of which he receives $15. Thread, buttons, lining, etc., cost him $16. How much does he get for his labor?

15. A man sold a certain number of papers for 50 cents. If he had sold 9 more, he would have received 95 cents. How many papers did he sell?

BILLS.

546. BROOKLYN, *July* 31, 1894.

MRS. H. J. SHORT

Bought of ABRAHAM & STRAUS.

	1¼ yd. Plaid	$1.00			
	16 yd. Cambric	.05			
	12 pr. Socks	.25			
	1 Wrapper		1	98	
	4 yd. Silk	.65			
	1 pr. Gloves		2	25	
	2 spools Silk	.08			
					$

1. Copy the above, filling in the cost of each item and the total.

2. Robert J. Wildes buys of Caswell & Donaldson 64 lb. of sugar @ 4½¢; 28 lb. of lard @ 7½¢; 24 lb. of coffee @ 25¢; 1 bbl. flour @ $5.75; and 12 gal. of molasses @ 25½¢. Make out the bill.

3. Make out a bill for 10 pairs of men's shoes at $4.75; 4 pairs of boys' shoes at $1.47½; 6 pairs of slippers at $.87½; 9 pairs of girls' shoes at $2.43; 8 pairs of women's shoes at $3.37½.

4. Make out a bill for 8½ lb. of ham at 14¢ per lb.; 3¼ lb. of beefsteak at 24¢; 9 lb. of corned beef at 12¢; 10¼ lb. of chicken at 30¢; 12 lb. of roast beef at 18¢.

5. Make out a bill for 14 doz. collars, at $1.50 per dozen; 6 doz. pairs of cuffs, at $2.75 per dozen pairs; 4 doz. shirts, at $9.00 per dozen; 3 dozen ties, at $2.25 per dozen; 17 doz. pairs of socks, at $2.50 per dozen pairs.

DECIMALS.

547. Oral Exercises.

In the number 25, what does the 2 stand for?

In the number 467, what does the 4 represent? The 6? The 7?

In the number 33,333, give the value of the first 3 (commencing at the left). Of the second. Of the third. Of the fourth. Of the fifth.

The last 3 is what part of the number represented by the fourth 3? The third 3 is what part of the second? Each 3 is what part of the 3 to its left?

The value of each 3 in this number depends upon what?

In the number XXXIII, what is the value of the first X? Of the second? Of the third?

548. When we write $784.56, the 7 stands for seven times how many dollars? The eight for 8 times how many dollars? The 4 for four times how many dollars? The 5 stands for five times what part of a dollar? The 6 stands for six times what part of a dollar?

Hundreds.	Tens.	Units.	Decimal Point.	Tenths.	Hundredths.
7	8	4	.	5	6

This is read 784 *and* 56 hundredths.

37.5 is read 37 *and* 5 tenths.

6.492 is read 6 *and* 492 thousandths.

.0005 is read 5 ten-thousandths.

.01234 is read 1,234 hundred-thousandths.

56.000246 is read 56 *and* 246 millionths.

$497.625 is read 497 dollars and 62 cents 5 mills.

NOTE. — Cent means hundredth. Mill means thousandth.

NOTATION AND NUMERATION.

549. NOTE. In reading a number containing an integer and a decimal, the word *and* may be placed between the two, as is shown above. To avoid mistakes, the word *units* should be used after the integer in reading such numbers as 200.005, 3000.0075, etc. Say: Two hundred units and five thousandths, three thousand units and seventy-five ten-thousandths.

550. Read the following:

1. .7	8. 32.4	15. .005
2. 34.9	9. 1.025	16. 1.348
3. .36	10. .35	17. 32.6
4. .95	11. 100.025	18. 100.25
5. 3.275	12. .125	19. 627.009
6. 9.624	13. .99	20. .099
7. .09	14. .38	21. 23.23

551. Express in decimals:

1. 7 tenths.
2. 36 and 47 thousandths.
3. One hundred twenty-five thousandths.
4. One hundred units and twenty-five thousandths.
5. 47 hundredths.
6. Four hundred units and six tenths.
7. Four hundred six thousandths.
8. 3 and 56 hundredths.
9. Twenty-eight.
10. 65 tenths.
11. 6 and 5 tenths.
12. 465 and 8 hundredths.
13. 375 hundredths.
14. 4,000 tenths.
15. 887 and 72 hundredths.
16. 345 tenths.
17. 6,054 hundredths.
18. 6,000 and 54 hundredths.
19. 5 millionths.
20. 562 millionths.

552. United States Civil Service. Copyist of Mechanical Drawings.

1. The following table exhibits the number of applications for patents and the receipts and expenditures of the United States Patent Office during the years indicated. Required: (1) The sum total of applications, receipts, and expenditures during the whole period; (2) the average number of applications and the average amount of receipts and of expenditures per year, from 1882 to 1886, inclusive; and (3) the surplus for each year and the average surplus per year during the five years stated:

Year.	No. of Applications.	Receipts.	Expenditures.	Surplus.
1882	31,522	$1,009,219.45	$683,867.67	
1883	35,577	1,146,240.00	675,234.86	
1884	35,600	1,075,798.80	970,579.76	
1885	35,717	1,188,098.15	1,024,378.85	
1886	35,968	1,154,551.40	992,503.40	
Totals				
Average per year.				

2. Express in figures the following: One million one hundred thousand one and seven thousand four hundred seven millionths.

3. Express in words the following: 1,074,974.35.

4. Express in figures the following number: Eight billion three hundred four million seven thousand thirteen.

5. What would be the cost of $3\frac{7}{8}$ yards of cloth at $1.15 per yard?

6. A mechanical draftsman's salary is $1,000. Assuming that he works seven hours every day, with the exception of Sundays and of thirty working days' leave of absence, how much does he earn each hour that he works?

553. NOTE. A billion is a thousand million.

ADDITION OF DECIMALS.

554. Add:

1.	2.	3.	4.
.7	3.84	28.978	5.6
4.18	68.075	.28	.387
.005	.5	5.375	26.93
5.67	24.698	18.758	8.754
10.555	97.113		

5. .027 + 1.39 + 48.6 + 72.978
6. 234.96 + .675 + 50.4 + 6.02 + 1.001
7. 3.047 + 54.79 + .097 + .76 + .862
8. .8 + .38 + .479 + 27.87 + 375
9. .445 + 34.75 + 306.973 + .004 + 48.56
10. .81 + 12.654 + 234.79 + 8.6 + .603 + 42.96
11. 45.78 + .237 + 6.987 + 18 + 372.003 + 37.5
12. 4.745 + 36.58 + 725.894 + 9.87 + 75.357 + 86.74
13. 59.3 + 83 + 9.64 + 48.565 + 6.98 + 8.795 + 963.826
14. 13.387 + 72.563 + .7 + .603 + 7.245 + .483 + 9.25
15. 8.3 + 2.576 + 3.42 + 1.5 + 6.279 + .003 + 1.417
16. .2 + 2.356 + 1.14 + 2 + 4.96 + 3.272 + .7 + 3.54
17. 4.7 + 1.198 + .35 + 763.5 + 1,423 + 157.24 + .437 + 9.5
18. 7.369 + 1.72 + 32.948 + .429 + .7 + 3.14 + 695 + 7.005
19. 3.87 + 2.694 + .8 + 251.47 + 9.3 + 1.916 + 41.5 + 751.006
20. .37 + 6.3 + .008 + 9.63 + 96 + 47.82 + 637.46 + 1.923

SUBTRACTION OF DECIMALS.

555.

From	87.	182.01	1.	28.6
Take	3.7	4.624	.009	1.003
	33.3	177.386	.991	27.597

556. Find answers:

21. $1 - .057$

22. $1 - .245$

23. $6 - 3.324$

24. $4 - 2.491$

25. $3 - 1.568$

26. $7 - 4.736$

27. $3.587 - 1.34$

28. $91.352 - 72.456$

29. $42.007 - 17.658$

30. $68.217 - 39.4$

31. $9.84 - 5.672$

32. $45.268 - 23.068$

33. $219.843 - 187.95$

34. $681.38 - 94.572$

35. $1000 - 465.874$

36. $30.053 - 18.7$

37. $2{,}568.91 - 1{,}925$

38. $1.234 - .825$

39. $473.5 - 298.572$

40. $57.083 - 44.95$

MULTIPLICATION OF A DECIMAL BY AN INTEGER.

557. Three times 3 tenths equals how many tenths?

$.3 \times 8 =$ what?		$.3 \times 4 = ?$	$4 \times .3 = ?$	
1.7	7.5	.275	.85	.0036
$\times 8$	$\times 4$	$\times 12$	$\times 20$	$\times 110$
13.6	30.0	3.300	7.00	.3960

558. The products are 13.6, 30, 3.3, 7, and .396; the ciphers to the right of the decimals, having no value, are omitted in giving the answers.

559. Multiply:

41. $.36 \times 3$
42. 57.2×7
43. 6.4×122
44. 122×6.4
45. $.67 \times 4$
46. $.003 \times 512$
47. $512 \times .003$
48. $.056 \times 987$
49. $97 \times .005$
50. $5{,}430 \times .8$
51. 275×1.2
52. 38.4×25
53. $.048 \times 375$
54. 12.67×300
55. 6.57×9
56. $748 \times .97$
57. 8.76×43
58. $964 \times .347$
59. $570 \times .11$
60. $360 \times .005$

560. Sight Exercises.

Give products:

1. 684×10
2. 68.4×10
3. 3.28×10
4. 5.71×100
5. $5.71 \times 1{,}000$
6. $.961 \times 100$
7. $.57 \times 1{,}000$
8. $.09 \times 1{,}000$
9. $.026 \times 100$
10. 5.17×10

561. Give quotients:

11. $932 \div 100$
12. $86 \div 1{,}000$
13. $328 \div 10$
14. $9 \div 1{,}000$
15. $48 \div 1{,}000$
16. $684 \div 100$
17. $57.6 \div 10$
18. $24.3 \div 100$
19. $8.75 \div 10$
20. $932.5 \div 100$

DIVISION OF A DECIMAL BY AN INTEGER.

562. **Sight Exercises.**

1.	$8.64 \div 2$	**6.**	$.846 \div 6$
2.	$48.24 \div 4$	**7.**	$.048 \div 8$
3.	$.465 \div 3$	**8.**	$.81 \div 9$
4.	$8.40 \div 5$	**9.**	$.12 \div 5$
5.	$8.4 \div 5$	**10.**	$.34 \div 4$

563. Where it is necessary, ciphers may be annexed to the right of the decimal in the dividend.

$8\overline{).12}$	$15\overline{).06}$	$64\overline{)120.}$
.015	.004	1.875
		560
		480
		320
		0
.012	.413	
$125\overline{)1.5}$	$21\overline{)8.673}$	
250	27	
0	63	

564. Divide:

11.	$25\overline{)1.00}$	**21.**	$\frac{1}{4} =$
12.	$4\overline{)21.80}$	**22.**	$\frac{1}{8} =$
13.	$8\overline{).2}$	**23.**	$\frac{4}{5} =$
14.	$13\overline{)3.913}$	**24.**	$\frac{4}{50} =$
15.	$12\overline{)48.12}$	**25.**	$\frac{3}{8} =$
16.	$11\overline{)70.07}$	**26.**	$\frac{7}{125} =$
17.	$24\overline{)36.6}$	**27.**	$\frac{100}{32} =$
18.	$18\overline{).576}$	**28.**	$\frac{180}{75} =$
19.	$25\overline{)11.1}$	**29.**	$\frac{5000}{64} =$
20.	$32\overline{)62.000}$	**30.**	$\frac{1}{16} =$

565. Slate Problems.

31. A franc is 19.3 cents. Find the cost in United States money of goods amounting to 1,250 francs.

32. A merchant bought 1,800 meters of silk. How many yards did he buy, a meter being 39.37 inches?

33. A kilogram is 2.2046 pounds. What is the difference in weight between the English ton of 2,240 lb. and a French ton of 1,000 kilograms?

34. A cubic foot of water weighs 1,000 ounces. How many pounds does a cubic foot of gold weigh, gold being 19.4 times as heavy as water?

35. There are 128 cubic feet in a cord. How many tons of 2,000 lb. are there in a cord of pine wood, the latter being .66 times as heavy as water?

36. A man buys three plots of ground containing 35.27, 17.8, and 40.375 acres, respectively. Find the total cost at $36 per acre.

37. How many pints are there in 2.375 gallons?

38. What decimal of a peck is a quart?

39. What will be the cost of carrying 468 tons of coal at $0.125 per ton?

40. A farmer sold one-eighth of his farm of 224.2 acres at $62.50 per acre. How much did he receive for it?

566. Boston Examination Questions. Mental.

1. $27 + 15 + 18 + 25 + 9 = ?$

2. James had half a dollar to spend; he bought 14 cents' worth of candy, and spent the rest of his money for oranges at 4 cents each. How many oranges did he buy?

3. How many weeks in 2 years?

4. A woman bought 7 lb. of rice at 12¢ a pound, and paid for it with a dollar bill. How much money did she receive in change?

5. A man paid one dollar for a bag of peanuts containing 3 pk. He sold them at $0.10 a quart. How much did he gain?

6. Take $8.25 from $12.75. How many quarters of a dollar are there in the difference?

7. One-half of our books are in the case; we have in all 184 books; one-half of the remainder are on the table. How many are on the table?

8. If three knives cost 45¢ each, what is the cost of all?

9. If one fish cost 25 cents, how much would $2\frac{1}{2}$ fishes cost?

10. John is going a journey of 100 miles; if he travels $\frac{3}{4}$ of the distance in the cars and the rest in a coach, how many miles will he travel in the coach?

11. Book, 75¢; pencil, 8¢; slate, 15¢ = ?

12. 20 boxes of berries at 15¢ = ?

13. At 6 cents each, how many bananas for $1.00? How many cents over?

14. 2 qt. = what part of a peck?

15. A man bought 30 apples at the rate of 3 for 5 cents. How much did he give for them?

16. If 6 apples cost 14 cents, what will 3 cost?

17. Add these numbers: 5, 9, 4, 7, 8, 6, 4, 5, 9, 2, 6, 5, 4, 6, 7, 9, 4, 5, 7, and 9.

18. How many times must I fill my glass, which holds $\frac{1}{2}$ a pint, to fill my pitcher, which holds a gallon?

19. I have a gross (144) of tacks. How many dozen tacks have I?

20. Bought 3 lb. of raisins worth 12 cents a pound; 2 doz. bananas at 25 cents a dozen. I gave the man a dollar bill. How much did he give back?

21. How many hours are there in a week?

22. If I pay 6 cents for a dozen apples, how much does each apple cost?

23. If John earned 16¢ Monday, 9¢ Tuesday, 20¢ Wednesday, 15¢ Thursday, 8¢ Friday, and 12¢ Saturday, how much did he earn in the whole week?

24. What will 3 bushels of sand cost at 4¢ a peck?

25. How many hours from 10 A.M. to 10 P.M.?

26. A cent is what part of a dime?

27. Annie spent 35 days in the country. How many weeks was she there?

28. Mrs. Hall divided 84 oranges equally among 12 girls. How many oranges did each girl receive?

29. If you give 24 cents for one thing, and 19 cents for another, what will both things cost?

30. If a quart of milk is worth 7¢, what is the value of two gallons?

567. Boston Examination Questions. Slate.

1. A man had 10.5 yd. of cloth, and used 4.125 yd. to make a coat. How many yards did he have left?

2. Find the cost of 2.578 acres of land, at $37 an acre.

3. How many acres of land could you buy for $76,225, if one acre cost $37?

4. If 23 buggies cost $4,025, what are 80 buggies worth?

5. A farmer's wife sold a storekeeper 15 doz. eggs @ 14¢, and 27 lb. of butter @ 22¢. She took her pay in cotton cloth at 12¢ a yd. How many yards did she get?

6. How many gills in 7 quarts and 1 pint?

7. How many bushels in 384 qt.?

8. Change 846 gills to gallons.

9. A farmer exchanged 16 cows, worth $68 each, for a span of horses. What are the horses worth apiece?

10. A horse cost $262, a chaise $228, and a hack three times as much as both. What did they all cost?

11. Find the amount of .87 and 8.7. Find the difference between .906 and 90.6.

12. Write in figures: Seventy-six thousand four hundred nine, and eighty-two thousandths. Nine hundred thousand nine hundred units, and thirty-one hundredths.

13. A boy bought a bicycle for $35. He rented it to another boy for 3 months at $2 a month, and then sold it for $33.50. Did he gain or lose, and how much?

14. If a quart of cream is worth 22 cents, what are two gallons worth?

15. How many pints are there in eleven bushels?

16. If $97 is $\frac{1}{7}$ of a sum of money, what is that sum?

17. Bought 87 pounds of tea at 45 cents a pound; sold it at 63 cents a pound. How much was gained?

18. What is the cost of 12 doz. eggs at the rate of 2 eggs for 3 cents?

19. If 3 boys can cut a cord of wood in 8 hours, how long will it take 4 boys to cut a cord?

20. John had 16 marbles, Henry half as many, and Frank as many as both the other boys. How many more marbles had Frank than John?

21. At 9¢ a quart, what is the cost of $2\frac{1}{2}$ gal. vinegar?

22. How many quarts in 2 bushels and 3 pecks?

23. If $\frac{1}{3}$ of a melon costs 15 cents, what will two melons cost at the same rate?

24. In a school there were 356 girls and 259 boys; if 25 girls and 32 boys leave, how many pupils remain in the school?

25. How many feet of string will be required to go around a room, if it is 30 ft. long and 25 ft. wide?

26. Which are worth more, 63 cows at $38 apiece, or 56 horses at $75 apiece? How much?

27. If I buy a bushel of walnuts for $3, and sell them at 5 cents a pint, how much will I make?

28. Suppose your mother gave you a 5-dollar bill to buy articles for the Sunday dinner, and you bought 6 lb. of roast beef at 25 cents a lb., 1 pk. spinach at 45 cents, 2 qt. of onions at $12\frac{1}{2}$ cents, $1\frac{1}{2}$ doz. oranges at 12 cents, 2 qt. of milk at 7 cents. How much change would you bring home to your mother?

29. In 15 gal. 1 qt. 0 pt. 3 gills, how many gills?

30. Write 83, 47, 69, 79, and 56 in Roman numbers.

568. Wilmington, Del., Public Schools. Examination Questions.

1. What is meant by $\frac{5}{6}$ of any number or thing? Make a drawing to show what you mean.

2. What part of 8 is 3? What part of 7 is 4?

3. Reduce $\frac{2}{5}$, $\frac{3}{4}$, $\frac{2}{3}$, and $\frac{4}{15}$ to fractions having common denominators.

4. Add $\frac{2}{3}$, $4\frac{1}{2}$, $5\frac{2}{5}$, and $10\frac{3}{4}$.

5. Subtract $10\frac{3}{7}$ from $18\frac{3}{8}$.

6. Bought 5 dozen lemons at 11 cents a dozen, and sold them at 2 lemons for 5 cents. How much was the gain?

7. Bought sugar for $5\frac{7}{8}$ cents a pound, and sold it for $6\frac{1}{2}$ cents a pound. What was the gain on 200 pounds?

8. From a piece of muslin containing $37\frac{1}{2}$ yards, $10\frac{1}{4}$ yd. were sold to one person, and $4\frac{3}{8}$ to another. How much remained in the piece?

9. If a man earns $14\frac{1}{2}$ dollars in a week, and spends $8\frac{3}{4}$, how much does he save in fourteen weeks?

10. If a boy is in school $5\frac{1}{4}$ hours a day, how many hours is he in school in 200 days?

11. If a girl studies $5\frac{1}{4}$ hours in school, and $1\frac{1}{2}$ hours at home each day, how many hours does she study in a week of five days?

12. How many times is $4\frac{1}{2}$ contained in 27?

13. A man walks $12\frac{3}{8}$ miles in $4\frac{5}{8}$ hours. How many miles an hour is that?

14. At $7.86 a barrel, what will $18\frac{5}{8}$ barrels of flour cost?

15. If $2\frac{1}{2}$ bushels of oats will keep a horse one week, how long will 18 bushels keep him?

16. Bought 5 bushels of apples at $62\frac{1}{2}$ cents a bushel, and sold them at $12\frac{1}{2}$ cents a half-peck. What was the gain?

17. What will 12 pounds and 10 ounces of beef cost at 16 cents a pound?

18. If a milk can holds 15 gallons, 3 quarts, and 1 pint, how many half-pints does it hold?

19. Divide 8,765,434 by 902.

20. Write in figures: Nine thousand twenty-five. Seven million three thousand eight. Eight hundred five thousand nine. Seventy-two thousand three hundred ten. Ten thousand twenty.

MEASUREMENTS.

569. Preliminary Exercises.

Draw a square each side of which is one inch. This is called a square inch.

Draw a rectangle two inches long, one inch wide. How many square inches will it contain?

Draw a rectangle three inches long, two inches wide. Divide it into one-inch squares. Count them. How many are there? How many square inches in the rectangle?

How many square inches in a rectangle 6 inches long, 3 inches wide?

How many square inches in a rectangle 4 inches long, 4 inches wide?

About how long is your slate? About how wide? About how many square inches are there in its surface?

How many square inches are there in a rectangle 12 inches long, 3 inches wide? In a rectangle 1 foot long, 3 inches wide? In a rectangle 1 foot 1 inch long, 4 inches wide?

570. Slate Exercises.

How many square inches in each of the following rectangles?

1. 13 in. by 14 in.
2. 17 in. by 9 in.
3. 18 in. by 7 in.
4. 23 in. by 15 in.
5. 21 in. by 19 in.
6. 37 in. by 14 in.
7. 13 in. by 42 in.
8. 27 in. by 31 in.
9. 18 in. by 22 in.
10. 64 in. by 29 in.
11. 1 ft. by 7 in.
12. 1 ft. 1 in. by 11 in.

571. NOTE. Change each dimension to inches before multiplying.

13. 1 ft. 3 in. by 12 in.
14. 1 ft. by 1 ft.
15. 1 ft. 4 in. by 1 ft.
16. 2 ft. 6 in. by 1 ft.
17. 2 ft. 6 in. by 1 ft. 3 in.
18. 3 ft. 7 in. by 2 ft. 9 in.
19. 4 ft. 11 in. by 1 ft. 8 in.
20. 5 ft. 3 in. by 2 ft. 11 in.

572. Oral Exercises.

How many square feet in a rectangle 2 feet long, 1 foot wide? 6 feet long by 5 feet wide? 9 feet long by 7 feet wide?

573. Slate Exercises.

Find the square feet in the following:

1. 12 ft. by 14 ft.
2. 15 ft. by 17 ft.
3. 19 ft. by 11 ft.
4. 23 ft. by 15 ft.
5. 18 ft. by 16 ft.
6. 29 ft. by 12 ft.
7. $15\frac{1}{2}$ ft. by 12 ft.
8. 15 ft. 6 in. by 12 ft.
9. $18\frac{3}{4}$ ft. by 16 ft.
10. 18 ft. 9 in. by 16 ft.

574. NOTE. Change the inches to fractions of a foot.

11. $23\frac{1}{2}$ ft. by 18 ft.
12. 24 ft. 8 in. by 18 ft.
13. 19 ft. 3 in. by 16 ft.
14. 24 ft. by 17 ft. 9 in.
15. 24 ft. by 16 ft. 1 in.
16. 36 ft. by 23 ft. 5 in.
17. 13 ft. by $24\frac{3}{4}$ ft.
18. 13 ft. 4 in. by 24 ft.
19. 26 ft. 8 in. by 15 ft.
20. $12\frac{1}{2}$ ft. by 12 ft.

575. Suggestive Examples.

Measure the top of the desk, and calculate the surface in square inches. (Do not include fractions of an inch.)

Measure the blackboard, and find how many square feet in its surface. (Do not include fractions of a foot.)

Calculate the number of square inches in a pane of glass in the school-room window.

Find the number of square feet in the floor of the class-room.

Find the number of square feet in the class-room ceiling.

Estimate the height of the class-room, and calculate the number of square feet in the front wall. In the rear wall. In the right-hand wall. In the left-hand wall.

576. Slate Problems.

SUGGESTION. When the surface is required in square inches, change each dimension to inches; when required in square feet, express each dimension in feet, or in feet and the fraction of a foot; when required in square yards, etc., express each dimension in yards, etc.

1. How many square feet are there in the surface of a field 125 feet long, 87.5 feet wide?

2. A rug is 2 yards long, $1\frac{3}{8}$ yards wide. How many square yards does it contain?

3. How many square yards are there in a strip of carpet 6 yards long, 27 inches ($\frac{3}{4}$ yd.) wide?

4. Find the number of square meters in a room 12 meters long, 9.75 meters wide.

5. At 50 cents per square yard, what will be the cost of the oil-cloth needed to cover a floor 18 feet (6 yd.) long, 15 feet (5 yd.) wide?

6. What will be the cost, at \$1.50 per square yard, of carpeting a room $6\frac{1}{2}$ yards long, 15 feet wide?

7. At 3 cents a square foot, how much must be paid for 10 boards, each 16 feet long, $\frac{1}{2}$ foot wide?

8. A field is 30 rods long and 24 rods wide. How many square rods will it contain after a strip 24 rods long and 2 rods wide is taken from it for a road?

9. How many square yards of plastering will be required for a ceiling 18 feet long, 15 feet wide?

10. If a roll of wall paper is 24 feet long and 18 inches wide, how many square yards does it contain?

CHAPTER VII.

FRACTIONS. — DECIMALS. — BILLS. — DENOMINATE NUMBERS. — MEASUREMENTS.

ADDITION OF FRACTIONS.

577. Slate Exercises.

1. Find the sum of $10\frac{2}{3}$, $6\frac{4}{9}$, $5\frac{7}{8}$.

Since 9 is a multiple of 3, any multiple of 9 will be a multiple of 3. Omitting the latter number, we find the least common multiple of 8 and 9, 72, which is the least common denominator of the fractions.

2. Add $2\frac{1}{3}$, $\frac{3}{4}$, $5\frac{2}{7}$, $4\frac{1}{8}$

Omitting 4, which is a factor of 8, we find the least common multiple of 3, 7, 8.

$$3 \times 7 \times 8 = 168$$

3. $6\frac{2}{3} + 4\frac{4}{15} + 7\frac{3}{5} + \frac{2}{5} = ?$

L. C. M. $= 15 \times 8$ Omit 5 and 3.

4. $17\frac{3}{8} + 4\frac{5}{8} + 26\frac{4}{7}$

$$8 \times 9 \times 7 = 504$$

	504
$17\frac{3}{8}$	189
$4\frac{5}{8}$	280
$26\frac{4}{7}$	432
	$\frac{901}{504} = 1\frac{397}{504}$

5. $2\frac{1}{15} + 8\frac{1}{6} + 27\frac{2}{5} + 9\frac{1}{5}$

L. C. M. of 15 and $6 = ?$

6. $29\frac{8}{10} + 45 + 16\frac{4}{15}$

7. $\frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6}$

8. $1\frac{1}{2} + 5\frac{3}{8} + 13\frac{5}{12} + 8\frac{2}{3} + 19\frac{5}{6}$

9. $8\frac{3}{10} + 37\frac{3}{4} + 28\frac{4}{5} + 9\frac{9}{20} + 19\frac{1}{2}$

10. $\frac{7}{10} + 2\frac{31}{100} + 81\frac{7}{20} + 15\frac{9}{25}$

SUBTRACTION OF FRACTIONS.

578. Find answers:

11. $12\frac{1}{6} - 3\frac{1}{4}$
12. $23\frac{5}{12} - 16\frac{7}{8}$
13. $47\frac{9}{40} - 8\frac{3}{5}$
14. $102\frac{3}{8} - 84\frac{5}{6}$
15. $39\frac{4}{15} - 19\frac{7}{15}$
16. $39\frac{9}{20} - 23\frac{7}{30}$
17. $92\frac{7}{10} - 68\frac{5}{12}$
18. $830\frac{1}{12} - 807\frac{7}{60}$
19. $12{,}345 - 6{,}082\frac{17}{84}$
20. $320\frac{9}{16} - 120\frac{7}{12}$

REVIEW.

579. Perform the operations indicated:

21. $16 \times (2\frac{7}{8} + 1\frac{3}{4})$
22. $(8\frac{1}{3} - 3\frac{1}{2}) - 1\frac{5}{8}$
23. $18\frac{1}{2} - (3\frac{1}{3} - 1\frac{5}{8})$
24. $(24\frac{1}{2} - 15\frac{2}{3}) \times 36$
25. $(46\frac{3}{10} - 17\frac{3}{5}) \div 7$
26. $(50\frac{5}{6} \div 5) + 12\frac{1}{2}$
27. $100 - (4 \times 13\frac{3}{7})$
28. $(83\frac{7}{8} + 17\frac{2}{3}) \times 24$
29. $83\frac{7}{8} + (17\frac{2}{3} \times 24)$
30. $\dfrac{7 \times 2}{15 \times 3} - \dfrac{4}{15}$

FACTORS AND MULTIPLES.

580. Oral Exercises.

Give two factors of:

	4 *Ans.* 2, 2	6 *Ans.* 2, 3	
1. 9	6. 25	11. 39	16. 57
2. 10	7. 26	12. 46	17. 58
3. 14	8. 34	13. 49	18. 62
4. 21	9. 35	14. 51	19. 65
5. 22	10. 38	15. 55	20. 69

581. Sight Exercises.

Give three factors of:

1. 8	6. 28	11. 50	16. 70
2. 12	7. 30	12. 52	17. 75
3. 18	8. 42	13. 63	18. 78
4. 20	9. 44	14. 66	19. 98
5. 27	10. 45	15. 68	20. 99

PRIME NUMBERS.

582. A number that has no factors is a *prime number.*

1, 2, 3, 5, 7, etc., are prime numbers.

583. 1. Name the prime numbers between 10 and 20.

2. Between 20 and 30.
3. Between 30 and 50.
4. Between 50 and 70.
5. Between 70 and 100.

584. Sight Exercises.

Give the prime factors, commencing with the smallest.

1. 15	6. 40	11. 64	16. 80
2. 16	7. 48	12. 72	17. 81
3. 24	8. 54	13. 74	18. 82
4. 32	9. 56	14. 76	19. 84
5. 36	10. 60	15. 77	20. 85

585. Slate Exercises.

1. 86	6. 92	11. 100	16. 576
2. 87	7. 93	12. 120	17. 840
3. 88	8. 94	13. 210	18. 1,152
4. 90	9. 95	14. 240	19. 1,728
5. 91	10. 96	15. 360	20. 2,016

GREATEST COMMON DIVISOR.

586. A common factor of two or more numbers is a number that will divide each of them without remainder.

The largest number that is a factor of two or more numbers is called the *greatest common divisor.*

587. Sight Exercises.

Find the greatest common divisor of:

1. 27 and 48
2. 25 and 35
3. 36 and 54
4. 26 and 39
5. 42 and 63
6. 34 and 51
7. 32 and 48
8. 45 and 75
9. 40 and 65
10. 54 and 69

588. Slate Exercises.

Reduce the following fractions to lowest terms:

1. $\frac{144}{168}$
2. $\frac{275}{300}$
3. $\frac{144}{216}$
4. $\frac{132}{176}$
5. $\frac{275}{350}$
6. $\frac{28}{112}$
7. $\frac{81}{96}$
8. $\frac{51}{69}$
9. $\frac{512}{640}$
10. $\frac{324}{432}$
11. $\frac{576}{840}$
12. $\frac{136}{204}$

LOWEST TERMS.

589. How can you tell that a number is divisible by 2? By 5?

A number is divisible by 3 when the sum of its digits (figures) is divisible by 3; it is divisible by 9, when the sum of its digits is divisible by 9.

A number is divisible by 4, when the number expressed by its last two figures is divisible by 4.

When is a number divisible by 25?

590. A fraction is reduced to lowest terms by dividing the numerator and the denominator by their greatest common divisor.

591. Reduce to its lowest terms $\frac{169}{1001}$.

In this example, it is not easy to ascertain by inspection any number that will divide both terms. In such cases, the greatest common divisor is found by dividing the denominator by the numerator. The remainder is divided into the numerator, and each subsequent remainder is divided into the corresponding divisor until there is no longer a remainder. This last divisor is the *greatest common divisor* of the two numbers.

$$\begin{array}{r} \quad 5 \\ 169\overline{)1001}\quad 1 \\ 156\overline{)169} \\ 13\overline{)156} \\ 12 \end{array}$$

13 is the greatest common divisor.

$$\frac{169 \div 13}{1{,}001 \div 13} = \frac{13}{77} \text{ lowest terms.}$$

592. In reducing fractions to lowest terms, the above method of finding the greatest common divisor should not be resorted to if it is possible to get along without it.

593. Reduce to lowest terms:

1. $\frac{123}{300}$

A look at both terms shows that 3 is a common factor. This reduces the fraction to $\frac{41}{100}$. 41 is a prime number, and is not a factor of 100, so that $\frac{41}{100}$ cannot be reduced to lower terms.

2. $\frac{432}{621}$

$$4+3+2=9; \quad 6+2+1=9$$

Since the sum of the digits of each term is divisible by 9, this number is a common factor, and reduces the fraction to $\frac{48}{69}$, etc.

3. $\frac{420}{785}$

5 is clearly a common factor, etc.

4. $\frac{42}{98}$
5. $\frac{111}{222}$
6. $\frac{49}{91}$
7. $\frac{52}{65}$
8. $\frac{217}{248}$
9. $\frac{78}{221}$
10. $\frac{68}{153}$
11. $\frac{77}{182}$
12. $\frac{51}{68}$
13. $\frac{119}{187}$
14. $\frac{115}{161}$
15. $\frac{216}{240}$

LEAST COMMON MULTIPLE.

594. Sight Exercises.

Give the least common multiple of:

1. 16 and 24
2. 12 and 15
3. 3, 9, 11
4. 4, 12, 16
5. 2, 3, 4, 5, 6
6. 2, 3, 5, 9, 10
7. 2, 3, 5, 6, 9, 10
8. 3, 6, 9, 12, 4, 18
9. 2, 7, 14, 3, 9
10. 5, 10, 20, 25, 50

595. Slate Exercises.

Add $14\frac{1}{3}$, $73\frac{2}{9}$, $6\frac{5}{7}$, $\frac{9}{14}$, $23\frac{1}{6}$, $101\frac{3}{14}$, $58\frac{1}{2}$, $9\frac{7}{12}$.

Here we have to find the least common multiple of 3, 9, 7, 14, 6, 14, 2, 12.

Rejecting 3, 6, 2 because they are factors of 12; 7, a factor of 14; and one 14, we have to find the least common multiple of

9 14 12

Divide these numbers by a prime number that is exactly contained in any two of them, bringing down the numbers that are not multiples of the divisor.

2	9	14	12
3	9	7	6
	3	7	2

Taking 2 as a divisor, bring down 9, and write quotients 7 and 6.

3 being a factor of two of the three numbers, 9, 7, 6, is taken as the next divisor. 3 is written as a quotient, 7 is brought down, 2 is a quotient.

As there is no factor common to any two of the numbers, 3, 7, 2, we find the least common multiple by multiplying together the two divisors and these three numbers.

$2 \times 3 \times 3 \times 7 \times 2 = 252$ L. C. M.

252

$14\frac{1}{3}$
$73\frac{2}{9}$
$6\frac{5}{7}$
$\frac{9}{14}$
$23\frac{1}{6}$
$101\frac{3}{14}$
$58\frac{1}{2}$
$9\frac{7}{12}$

Find the sum.

596. Find the least common multiple of the denominators of the fractions $\frac{3}{4}$, $\frac{11}{20}$, $\frac{5}{6}$, $\frac{17}{30}$, $\frac{23}{45}$, $\frac{7}{12}$.

2	20	30	45	12	Omit 4 and 6.
2	10	~~15~~	45	6	Strike out 15, a factor of 45.
	~~5~~		45	~~3~~	Strike out 5 and 3, factors of 45.

L. C. M. $= 2 \times 2 \times 45 = 180$

Add the fractions.

597. Find the L. C. M. of:

1. 4, 6, 3, 5, 8, 20. Strike out 4, 3, 5.
2. 9, 15, 15, 4, 4, 12, 25. Strike out one 15 and two 4's.
3. 2, 3, 5, 7, 5, 14, 10, 12, 24
4. 2, 3, 5, 6, 8, 10, 15, 16, 80
5. 20, 30, 40, 50
6. 2, 3, 4, 6, 8, 12, 16, 24
7. 24, 12, 5, 3, 10, 18
8. 11, 3, 7, 77, 33
9. 18, 5, 9, 40, 16
10. 10, 12, 15, 21

ADDITION AND SUBTRACTION OF FRACTIONS.

598. In adding or subtracting fractions, they must be reduced to a common denominator. The *least common denominator* is the least common multiple of the denominators.

In the following examples, determine the least common denominator by *inspection*, if possible.

599. Add:

1. $8\frac{4}{7}$, $5\frac{1}{4}$, $3\frac{1}{8}$
2. $45\frac{3}{8}$, $20\frac{1}{2}$, $8\frac{3}{4}$, $9\frac{1}{8}$
3. $32\frac{1}{4}$, $19\frac{3}{5}$, $6\frac{1}{2}$, $8\frac{12}{25}$
4. $2\frac{1}{8}$, 20, $3\frac{3}{4}$, $\frac{5}{12}$, $5\frac{1}{8}$
5. $8\frac{1}{5}$, $45\frac{5}{8}$, $21\frac{7}{20}$, $4\frac{1}{2}$, $\frac{21}{40}$
6. $\frac{2}{3}$, $\frac{3}{5}$, $\frac{1}{10}$, $\frac{3}{20}$, $\frac{16}{25}$
7. $63\frac{1}{10}$, $3\frac{2}{3}$, $2\frac{1}{6}$, $5\frac{4}{5}$, $7\frac{7}{12}$
8. $4\frac{3}{10}$, $7\frac{9}{100}$, 84, $6\frac{7}{1000}$, $\frac{23}{100}$
9. $5\frac{1}{12}$, $18\frac{1}{10}$, $3\frac{1}{5}$, $7\frac{1}{8}$, $8\frac{1}{4}$
10. $17\frac{9}{1000}$, $\frac{27}{100}$, $6\frac{3}{10}$, $\frac{15}{1000}$, $\frac{3}{100}$

600. Subtract:

11. $65\frac{11}{24} - 57\frac{5}{16}$
12. $18\frac{17}{40} - 9\frac{23}{60}$
13. $100\frac{41}{48} - 15\frac{13}{72}$
14. $102\frac{3}{16} - 27\frac{17}{20}$
15. $208\frac{11}{12} - 128\frac{19}{20}$
16. $251\frac{8}{21} - 27\frac{17}{35}$
17. $755\frac{19}{36} - 283\frac{25}{27}$
18. $100\frac{4}{100} - 89\frac{78}{1000}$
19. $123\frac{13}{24} - 80\frac{13}{32}$
20. $67\frac{1}{10} - 58\frac{41}{1000}$

601. Perform the operations indicated:

21. $\dfrac{21+5}{25+5} - \dfrac{21}{25}$
22. $\dfrac{21}{25} - \dfrac{21-5}{25-5}$
23. $(37\frac{5}{6} - 11\frac{3}{5}) - (28\frac{7}{15} - 19\frac{7}{12})$
24. $14\frac{5}{8} - 8\frac{1}{2} - 3\frac{3}{5} + 4\frac{1}{4}$
25. $(8\frac{3}{16} + 6\frac{2}{3}) - (8\frac{3}{16} - 6\frac{2}{3})$
26. $4\frac{3}{4} \times 16 \times 8\frac{7}{8}$
27. $(2\frac{2}{3} + 5\frac{1}{6}) \div (1\frac{1}{3} + 2\frac{1}{2} + 3\frac{1}{6})$
28. $(8\frac{1}{2} + 4\frac{1}{4}) \div (2\frac{1}{2} + 1\frac{3}{4})$
29. $(3\frac{5}{12} \times 36) \times 8\frac{3}{7}$
30. $4\frac{2}{3} + 3\frac{1}{2} - 6\frac{5}{7} + 17\frac{1}{6} - 9\frac{4}{5}$

602. Reduce to lowest terms:

31. $\frac{25}{100}$
32. $\frac{40}{100}$
33. $\frac{26}{1000}$
34. $\frac{125}{1000}$
35. $\frac{875}{1000}$
36. $\frac{86}{100}$
37. $\frac{625}{1000}$
38. $\frac{64}{1000}$
39. $\frac{875}{1000}$
40. $\frac{3125}{10000}$
41. $\frac{88}{1000}$
42. $\frac{625}{10000}$

603. Oral Problems.

1. A person traveling from New York to Albany (140 miles apart) has gone 93 miles. How much farther has he to go?

2. There are 196 pounds of flour in a barrel. How many pounds in $\frac{1}{4}$ bbl.?

3. How many fourths in $24\frac{3}{4}$?

4. Reduce $\frac{40}{56}$ to lowest terms.

5. Change $\frac{100}{7}$ to a mixed number.

6. Add $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

7. From a chest of tea containing $45\frac{1}{4}$ lb., $14\frac{3}{8}$ lb. are sold. How many pounds remain?

8. From $\frac{1}{3}$ of a dollar take $10\frac{2}{3}$ cents.

9. How many cents in $\frac{1}{4}+\frac{1}{5}+\frac{8}{10}$ of a dollar?

10. A farmer has $60\frac{3}{4}$ acres of pasture and $20\frac{3}{8}$ acres of woodland. How many acres in both?

11. The circumference of a circle is about $3\frac{1}{7}$ times its diameter. If the diameter is 8 feet, about what is the circumference?

12. Mary is 12 years and 7 months old; Jane is 3 years and 11 months older. How old is Jane?

13. In a year and a half William will be 7 years 2 months old. How old is he now?

14. What number multiplied by 3 equals 231?

15. What number between 7 and 12 is a prime number?

16. A boy received 9 marks in arithmetic, 8 in penmanship, and 7 in reading. What was his average mark?

17. $\frac{4}{7}$ of a class consists of boys. How many girls in the class if it contains 49 pupils?

18. If July 1 falls upon Tuesday, what will be the date of the third Tuesday of July?

19. If July 1 falls upon Thursday, upon what day will the first of August fall?

20. A man bought $20\frac{1}{2}$ lb. of sugar; he sold $10\frac{3}{4}$ lb. at one time and $6\frac{1}{2}$ lb. at another. How much had he left?

21. If 3 qt. 1 pt. oil cost 7 cents, what will 1 gal. 1 qt. cost?

22. How much will have to be paid for 7 cows at \$50 each, and 4 horses at \$150 each?

23. $\frac{3}{4}$ = how many hundredths?

24. What are the two factors of 87?

25. Find the G. C. D. of 36 and 54.

604. Slate Problems.

1. A merchant sold one firkin of butter at $19\frac{3}{4}¢$ per lb., a second at $20\frac{3}{4}¢$ per lb., a third at $16\frac{7}{8}¢$ per lb. What was the average price per lb., each firkin containing 56 lb.?

2. If eggs are sold at the rate of 21 for 25 cents, how much will be paid for $5\frac{1}{4}$ dozen?

3. If a train travels 45 miles per hour, how far will it go from half-past 9 in the morning to a quarter of 7 in the evening?

4. To the sum of $6\frac{7}{8}$ and $19\frac{2}{8}$ add their difference, and find how often the greater number is contained in this total.

5. A mechanic has deposited in the savings bank \$35 per month for 11 months, and \$20 the twelfth month. His expenses have averaged \$3 each day of the year. What are his daily wages for the 300 days he has worked?

6. A merchant sold 4 pieces of cloth containing $27\frac{1}{2}$ yd., $26\frac{7}{8}$ yd., $29\frac{5}{8}$ yd., and $28\frac{1}{8}$ yd., respectively. How much did he receive for the cloth at 96 cents per yard?

7. Reduce $\frac{189}{252}$ to lowest terms.

8. A man has $8\frac{5}{16}$ bu. of peanuts. He puts them into bags holding $\frac{1}{64}$ bu. How many bags does he fill?

9. A 160-acre farm consists of 5 fields. The first contains 17.38 acres, the second 29.4 acres, the third 35.073 acres, the fourth 25.875 acres. How many acres are there in the fifth field?

10. How many seconds in 7 hours 15 minutes?

11. Find the total cost of 2 doz. rockets at \$7.50 per gross, 3 dozen Roman candles at \$9.60 per gross, and 24 doz. pin wheels at \$1.35 per gross. (1 gross = 12 doz.)

12. From a piece of silk that contained $28\frac{1}{2}$ yd., there were sold $2\frac{1}{2}$ yd., $6\frac{1}{8}$ yd., and $13\frac{3}{4}$ yd. Find the value of the remainder at \$1.20 per yd.

13. Three pieces of cloth bought at \$2 per yard cost \$150. The first piece measures $23\frac{1}{2}$ yd., the second measures $30\frac{3}{8}$ yd. How many yards in the third piece?

14. Three lots of tea were sold for \$330. The second contained twice as much as the first, and the third three times as much as the first. The third lot contained 330 pounds. Find the selling price of the tea per pound.

15. What part of a person's income remains after he spends $\frac{1}{3}$, $\frac{4}{15}$, and $\frac{1}{5}$ of it?

16. A boy loses $\frac{1}{2}$ of his marbles, and he gives away $\frac{1}{4}$ of them. If he has 17 marbles left, how many had he at first?

17. A cask of molasses contained 80 gallons. One-fourth of it leaked out. If the molasses cost 60 cents per gallon, what price must be charged for the remainder so that there will be no loss.

18. A dealer sells $1\frac{3}{4}$ gross, $3\frac{7}{8}$ gross, $4\frac{11}{16}$ gross, $9\frac{1}{18}$ gross, and $8\frac{2}{3}$ gross of lead pencils at 36 cents per dozen. How much does he receive for all?

19. There are four towns, A, B, C, and D, on a certain railroad running east and west. A is $41\frac{1}{2}$ miles west of C; D is $39\frac{1}{4}$ miles east of B; B is $22\frac{1}{2}$ miles west of C. How many miles from A to D? Make a diagram.

20. If $12\frac{1}{2}$ dozen rockets cost \$5.75, what will 15 dozen cost?

SPECIAL DRILLS.

605. Give sums:

$59+75$	$22+34+18$	$560+390$	$225+154$	$65+86$
$67+83$	$19+47+30$	$270+280$	$315+421$	$59+47$
$94+38$	$25+35+26$	$640+260$	$437+260$	$88+22$
$66+56$	$17+18+19$	$430+480$	$540+355$	$61+39$

606. Give remainders:

$134-75$	$750-290$	$131-65$	$279-154$	$124-89$
$150-83$	$510-220$	$123-84$	$386-263$	$112-56$
$132-94$	$630-380$	$156-78$	$457-237$	$180-89$
$122-56$	$820-560$	$164-97$	$668-325$	$100-61$

607. Give products:

49×2	123×3	46×6	47×25	48×8
47×3	431×2	34×6	25×36	37×8
48×4	122×4	38×7	33×25	46×9
43×5	332×3	49×7	25×27	35×9

608. Give quotients:

$141\div3$	$111\div37$	$925\div25$	$266\div7$	$266\div38$
$192\div4$	$192\div48$	$875\div25$	$296\div8$	$296\div37$
$215\div5$	$215\div43$	$750\div25$	$414\div9$	$414\div46$
$276\div6$	$276\div46$	$625\div25$	$360\div8$	$360\div45$

609. Give answers:

$\frac{1}{2}+\frac{2}{3}$	$1\frac{1}{2}-\frac{2}{3}$	$66\times1\frac{2}{3}$	$\frac{1}{2}\div\frac{2}{3}$	$18\frac{2}{3}\div2\frac{2}{3}$
$\frac{2}{3}+\frac{3}{4}$	$1\frac{2}{3}-\frac{3}{4}$	$84\times1\frac{3}{4}$	$\frac{2}{3}\div\frac{3}{4}$	$21\frac{3}{5}\div2\frac{2}{5}$
$\frac{3}{4}+\frac{1}{5}$	$1\frac{2}{5}-\frac{1}{2}$	$100\times1\frac{4}{5}$	$\frac{3}{4}\div\frac{1}{5}$	$10\frac{4}{7}\div\frac{2}{7}$
$\frac{2}{3}+\frac{3}{5}$	$1\frac{3}{5}-\frac{2}{3}$	$126\times1\frac{5}{6}$	$\frac{2}{3}\div\frac{3}{5}$	$10\frac{5}{9}\div2\frac{1}{9}$

610. Oral Problems.

1. Find the cost of 1 lb. of tea at 75 cents, and a piece of ham at 56 cents.

2. A farmer sold 58 sheep from his flock of 121 sheep. How many remained?

3. What will be paid for 8 lb. of coffee at 35¢ per lb.?

4. A laborer received $4.88 for four days' work. How much did he earn per day?

5. At $40 each, how many cows can be purchased for $2,000?

6. Bought 20 lb. of sugar at 5¢ per lb., and 2½ lb. of butter at 30¢. What was the amount of my bill?

7. A piece of cloth measuring 31½ yards was divided into 2 equal parts. Find the length of each.

8. How many weeks in a year of 366 days?

9. If I pay 25 cents for 3 pounds of cherries, how many pounds can I buy for $1.25?

10. Find the cost of a bushel and a peck of peanuts at the rate of 5 cents per quart.

11. A farmer had 164 acres of land. How much had he left after selling 87 acres?

12. Find the total number of pounds in 3 tubs of butter weighing respectively 25 pounds, 34 pounds, and 36 pounds.

13. At 60¢ per lb., how much tea can be bought for $5.85?

14. A drover paid $219 for oxen, at an average price of $73. How many did he buy?

15. What will be the cost of 20 bu. of wheat at $1.04½ per bu.?

16. At 24¢ per lb., how many ounces of butter can be bought for 18¢?

17. A woman pays $540 per year for a house. What is the rent per month?

18. How many weeks in 294 days?

19. At 72¢ per yard, what will be the cost of 2 ft. 11 in. of lace?

20. How much does a grocer receive for a barrel of flour, 196 lb., retailed at 3 cents per lb.?

21. If 47 men can do a piece of work in 4 days, how long will it take 1 man to do the same work?

22. Find the cost of 36 acres of land at $25 per acre.

23. If it takes $3\frac{1}{2}$ yards of cloth to make a coat, how many coats can be made from $24\frac{1}{2}$ yards?

24. How much will be paid for 84 yards of silk at $\$1\frac{3}{4}$ per yard?

25. If a certain quantity of provisions will last one man 215 days, how long will it last 43 men?

611. United States Civil Service. Examination for Junior Clerk: Post Office.

1. Add the following, placing the total at the bottom:

$210,286.36
188,763,129.37
490,206.57
6,433,132,873.68
8,856,764,397.49
563,097,579,084.03
3,235,602,007.70

2. The area of New Hampshire is 5,955,200 acres; the area of South Carolina, 19,564,800 acres, and the area of Pennsylvania, 28,937,600. By how much does the area of Pennsylvania exceed the areas of New Hampshire and South Carolina combined?

3. During the year 1886 a postmaster rented a building at the rate of $100 a month, and paid two clerks $45 each per month, and had left out of his annual salary $200. What was his salary?

4. Write in words the following numbers and abbreviations: 903,014 lb. & 15 oz.

5. Write in figures the following number: One million twenty-three thousand five.

6. A mail package contains 4,992 letters averaging one-half ounce each. How many pounds of mail in the package?

7. The postmaster at Pittsfield, Mass., made requisition for 98 sheets of 1-cent stamps, 54 sheets 2-cent stamps, 32 sheets 3-cent stamps, 12 sheets 5-cent stamps, and 6 sheets 10-cent stamps. What was the total value of the stamps required, each sheet containing 100 stamps?

8. The total weight of a newspaper mail is 918 pounds. What is the weight in ounces?

9. Write in sign and figures: Eight hundred twenty-five thousand twenty-five dollars and seven cents.

10. A postmaster buys 5 gross of pencils for $21.60. What is the cost of each pencil?

612. Night Inspector: Custom House.

1. Add the following, placing the total at the bottom:

$1,811,187.87
3,705.90
675.25
10,289.16
742,155.74
429.39
6,873.68
397.49
1,956,374.20

2. A merchant purchased twenty-seven hundred nine gallons of wine, from which he sold one hundred fifty-seven gallons two quarts and one pint. How much had he left?

3. A merchant bought 21 barrels of flour at \$7.85 a barrel, and 906 yards of duck at \$0.32 a yard. He sold the flour at \$8.35 a barrel and the duck at \$0.28 a yard. Did he gain or lose by the transaction, and how much?

4. Write in words the following number: 10,501,045.

5. Write in words the following amount: \$11,103,025.375.

6. If the average daily receipts of the United States Treasury for the year 1882, Sundays included, were \$1,436,906.77, what were the gross receipts of that year?

7. If 99 bars of iron cost \$330, what will one bar cost?

8. What will be the duty on 10 bales of silk, each weighing 650 lb., at 40 cents per pound?

9. At \$3.25 per day, how much will an opener and packer earn during the year 1887, excluding Sundays?

10. Express in signs and figures ten million ten thousand ten dollars and twenty-five cents.

613. Sight Exercises.

Add:

1. $3\frac{1}{2}+5\frac{1}{8}$	4. $11\frac{7}{8}+4\frac{1}{2}$	7. $8\frac{3}{4}+6\frac{7}{8}$
2. $4\frac{1}{2}+8\frac{3}{4}$	5. $7\frac{3}{5}+9\frac{7}{10}$	8. $15\frac{2}{3}+8\frac{1}{2}$
3. $9\frac{2}{3}+7\frac{5}{6}$	6. $5\frac{3}{4}+2\frac{2}{5}$	9. $9\frac{3}{5}+5\frac{2}{3}$

614. Subtract $8\frac{1}{2}$ from 10.

$(10\frac{1}{4}-8\frac{1}{2})$ is how much greater than $(10-8\frac{1}{2})$?

To subtract $8\frac{1}{2}$ from $10\frac{1}{4}$ mentally, we find the difference between $8\frac{1}{2}$ and 10, which is $1\frac{1}{2}$, and to this add $\frac{1}{4}$. The answer is $1\frac{3}{4}$.

10. $11\frac{3}{8}-6\frac{2}{3}=4\frac{1}{3}+\frac{3}{8}=?$

11. $14\frac{2}{7}-9\frac{1}{2}=4\frac{1}{2}+\frac{2}{7}=?$

615. Subtract at sight:

12. $23\frac{2}{5} - 19\frac{7}{10}$		18. $14\frac{1}{4} - 8\frac{3}{10}$	
13. $16\frac{3}{8} - 9\frac{3}{4}$		19. $27\frac{1}{3} - 7\frac{1}{3}$	
14. $18\frac{1}{4} - 3\frac{2}{8}$		20. $35\frac{1}{8} - 3\frac{1}{6}$	
15. $15\frac{1}{3} - 8\frac{3}{4}$		21. $11\frac{2}{7} - 6\frac{1}{2}$	
16. $9\frac{1}{2} - 2\frac{7}{8}$		22. $43\frac{3}{10} - 8\frac{4}{5}$	
17. $10\frac{1}{12} - 5\frac{1}{4}$		23. $50\frac{1}{6} - 4\frac{3}{4}$	

616. Slate Exercises.

Divide without writing products (Art. 385):

$$36\overline{)17837}\quad 495\tfrac{17}{36}$$

$$\begin{array}{r} 343 \\ \hline 197 \\ \hline 17 \end{array}$$

1. 4,320 ÷ 32	6. 42,387 ÷ 123
2. 5,387 ÷ 51	7. 73,690 ÷ 345
3. 8,795 ÷ 75	8. 105,261 ÷ 624
4. 10,246 ÷ 84	9. 423,958 ÷ 1,008
5. 21,321 ÷ 97	10. 867,293 ÷ 2,534

CANCELLATION.

617. Slate Problems.

1. If 17 horses cost \$4,387, what will I pay for 51 at the same rate?

618. Problems consisting of multiplication and division can be sometimes shortened by indicating the operations, and then canceling. To solve the above, we indicate the cost of one horse, $\frac{\$4387}{17}$, and of 51 horses,

$$\frac{4387}{17} \times 51 \text{ or } \frac{4387 \times \cancel{51}^{3}}{\cancel{17}}.$$

Since 17 is contained in 51 three times, we cancel both numbers by drawing a line through them, and we write a 3 above the 51. The answer is $\$4{,}387 \times 3 = \$13{,}161$.

2. If 15 eggs cost 25 cents, what will 10 dozen cost?

$$\frac{25 \times 10 \times 12}{15}$$

We indicate price of one egg by dividing by 15. Multiplying this by 10 times 12, we get the price of 10 dozen.

In this case, 15 is not contained in any number above the line. We divide 15 and 10 by 5, canceling them and writing quotients 3 and 2 alongside. 3 is contained in 12 4 times; so we cancel 3 and 12. Our answer now is 25 cents $\times$ 4 $\times$ 2 = 200 cents, or \$2.

$$\frac{25 \times \cancel{10}^{2} \times \cancel{12}^{4}}{\cancel{15}_{3}}$$

3. Eighteen men can do a piece of work in 26 days. How long will it take 13 men to do the same work?

One man will take 26 days $\times$ 18.

4. Seventeen barrels of flour, 196 lb. each, were put into bags holding 49 pounds each. How many bags of flour were put up?

5. At the rate of 23 cents for 7 pounds, how much would be paid for 91 pounds of flour?

6. A bank pays \$4 interest a year on every \$100. How much interest will be paid for 3 years on \$650?

7. At \$45 per thousand for bricks, what must I pay for 63,200 bricks?

8. If flour is \$6 per barrel (196 lb.), what must be paid for a 49-pound bag?

9. A grocer buys 84 dozen eggs, and sells them at the rate of 21 eggs for 25 cents. What does he receive for them?

10. A miller buys 9,840 pounds of wheat at 90 cents per bushel of 60 pounds. How much does he pay for it?

11. What will be the cost of 64 sheep, if 18 cost \$198?

12. If 18 men can do a piece of work in 42 days, how long will it take 21 men to do the same work?

13. What will be the cost of 66 doz. pens at 42 cents per gross of 12 doz.?

14. A certain quantity of hay feeds 15 horses 56 days. How long will it feed 14 horses?

15. A merchant bought 9 pieces of cloth, each containing 24 yards, for $189. What was the price per yard?

MULTIPLICATION OF FRACTIONS.

619. Oral Exercises.

What is $\frac{1}{2}$ of 2 fifths? Of 4 sevenths? Of 6 elevenths?

What is $\frac{1}{2}$ of $\frac{1}{2}$? Of $\frac{1}{3}$? Of $\frac{1}{4}$? Of $\frac{1}{5}$? Show by a diagram.

What is $\frac{1}{2}$ of $\frac{2}{3}$? Of $\frac{3}{4}$? Of $\frac{4}{5}$? Of $\frac{5}{6}$?

What is $\frac{1}{3}$ of $\frac{1}{2}$? $\frac{2}{3}$ of $\frac{1}{2}$? $\frac{3}{5}$ of $\frac{1}{2}$?

What is $\frac{1}{3}$ of $\frac{3}{4}$? $\frac{2}{3}$ of $\frac{3}{4}$? $\frac{3}{5}$ of $\frac{3}{4}$?

What is $\frac{1}{4}$ of $\frac{1}{3}$? $\frac{1}{4}$ of $\frac{2}{3}$? $\frac{3}{4}$ of $\frac{1}{3}$? $\frac{3}{4}$ of $\frac{2}{3}$?

What is the half of $1\frac{1}{2}$? Of $2\frac{1}{2}$? Of $3\frac{1}{2}$? Of $4\frac{1}{2}$?

What is one-third of $1\frac{1}{2}$? $\frac{2}{3}$ of $1\frac{1}{2}$? $\frac{1}{3}$ of $2\frac{1}{2}$? $\frac{2}{3}$ of $2\frac{1}{2}$?

620. Multiply $\frac{2}{3}$ by $\frac{4}{5}$.

This means to find $\frac{2}{3}$ of $\frac{4}{5}$.

Since $\frac{1}{3}$ of $\frac{1}{5} = \frac{1}{15}$, $\frac{2}{3}$ of $\frac{4}{5} = \frac{4}{15}$, and $\frac{2}{3}$ of $\frac{4}{5} = \frac{8}{15}$.

$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$; that is, the product of the numerators is divided by the product of the denominators.

NOTE. — Cancel when possible.

621. Multiply $\frac{2}{3}$ by $\frac{9}{10}$.

$\frac{1}{3}$ of $\frac{9}{10} = \frac{3}{10}$ $\quad$ $\frac{2}{3}$ of $\frac{9}{10} = 2 \times \frac{3}{10} = \frac{6}{5}$

$$\frac{2}{\cancel{3}_{1}} \times \frac{\overset{3}{\cancel{9}}}{\cancel{10}_{5}} = \frac{3}{5}$$

Show by a diagram that 2×3 tenths $= 3$ fifths.

622. Multiply $12\frac{1}{7}$ by $3\frac{4}{15}$.

Reduce the mixed numbers to improper fractions.

$$\frac{\overset{17}{\cancel{85}}}{\underset{1}{\cancel{7}}} \times \frac{\overset{7}{\cancel{49}}}{\underset{3}{\cancel{15}}} = \frac{119}{3} = 39\tfrac{2}{3}$$

623. Slate Exercises.

Multiply:

1. $\frac{2}{3}$ by 96
2. 128 by $\frac{3}{4}$
3. $\frac{4}{5}$ by $\frac{3}{7}$
4. $\frac{5}{6}$ by $\frac{7}{8}$
5. $\frac{3}{5}$ by $\frac{5}{6}$
6. $3\frac{5}{12}$ by 72
7. $24\frac{2}{9}$ by 18
8. $69\frac{3}{7}$ by 32
9. $111\frac{4}{15}$ by 28
10. 67 by $\frac{15}{67}$
11. $2\frac{1}{2}$ by $3\frac{3}{5}$
12. $\frac{9}{16} \times 2\frac{2}{3}$
13. $17\frac{1}{4}$ by $6\frac{2}{3}$
14. $6\frac{1}{8} \times \frac{4}{7}$
15. $4\frac{1}{4}$ by $8\frac{4}{5}$
16. $\frac{5}{14} \times 8\frac{2}{5}$
17. $3\frac{3}{7}$ by $12\frac{1}{4}$
18. $\frac{7}{8} \times 4\frac{1}{2}\frac{2}{5}$
19. $\frac{5}{7}$ by $\frac{3}{8}$ by $\frac{14}{15}$
20. $\frac{3}{40}\frac{7}{8}$ of $\frac{2}{3}\frac{8}{7}$ of $\frac{5}{7}$
21. $\frac{11}{12} \times \frac{6}{7} \times \frac{9}{22}$
22. $\frac{1}{3}\frac{2}{5}$ of $\frac{14}{15}$ of $\frac{2}{2}\frac{5}{7}$
23. $\frac{7}{8}$ of $65\frac{3}{5}$
24. $\frac{3}{4}$ of $55\frac{5}{6}$
25. $6\frac{1}{2} \times 7\frac{3}{5}$
26. $4\frac{1}{4} \times 5\frac{1}{5}$
27. $\frac{2}{3}$ of $4\frac{1}{2} \times 3\frac{2}{5}$
28. $\frac{5}{7}$ of $3\frac{1}{5} \times 4\frac{1}{11}$
29. $1\frac{1}{2} \times 2\frac{1}{3} \times 3\frac{1}{4}$
30. $2\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}$

624. Find answers:

31. $\dfrac{3\frac{1}{2} + 6\frac{1}{4}}{3}$
32. $(3\frac{1}{5} - 2\frac{1}{5}) \times \frac{5}{6}$
33. $\frac{1}{4}$ of $(5\frac{1}{3} - 3\frac{2}{3})$
34. $(24\frac{1}{8} + 16\frac{1}{8}) \div 8$
35. $(3\frac{1}{4} + 2\frac{1}{8}) \times (3\frac{1}{4} - 2\frac{1}{8})$
36. $(8\frac{2}{3} \times 21) - \dfrac{15\frac{5}{8}}{5}$
37. $5\frac{1}{2} + 6\frac{2}{3} + 7\frac{3}{4}$
38. $18\frac{5}{8} - 3\frac{2}{5} - 7\frac{1}{6}$
39. $\frac{2}{3}$ of $\frac{3}{4}$ of $(3\frac{1}{2} + 1\frac{3}{4})$
40. $(18\frac{1}{5} - 6\frac{3}{8}) \div 11$

DIVISION OF FRACTIONS.

625. Oral Exercises.

3 fourths is contained in 4 fourths how many times?

4 fourths ÷ 3 fourths = ?

$1 \div \frac{3}{4}$ = how many thirds?

626. Give answers in improper fractions.

$1 \div \frac{2}{3} = ?$ $\quad 1 \div \frac{5}{6} = ?$ $\quad 1 \div \frac{3}{8} = ?$

Can you show by a diagram that $1 \div \frac{2}{3} = 1\frac{1}{2} = \frac{3}{2}$?

627. Divide $\frac{4}{7}$ by $\frac{3}{5}$.

We can divide by reducing both fractions to a common denominator:

$$\frac{4}{7} \div \frac{3}{5} = \frac{20}{35} \div \frac{21}{35} = 20 \div 21 = \frac{20}{21}$$

The following is another method:

$\frac{3}{5}$ is contained in 1, $\frac{5}{3}$ times. In $\frac{4}{7}$ of 1, it is contained $\frac{4}{7}$ of $\frac{5}{3}$ times, or $\frac{20}{21}$.

628. To divide by $\frac{3}{5}$, we multiply by what fraction?

629. Divide $\frac{3}{4}$ by $\frac{9}{16}$.

$\frac{9}{16}$ is contained in 1, $\frac{16}{9}$ times. In $\frac{3}{4}$, it is contained $\frac{3}{4}$ of $\frac{16}{9}$ times.

Canceling, $\frac{\cancel{3}}{\cancel{4}} \times \frac{\overset{4}{\cancel{16}}}{\cancel{9}_{3}}$, we have $\frac{4}{3} = 1\frac{1}{3}$. *Ans.*

630. To divide by $\frac{9}{16}$, we multiply by what?

631. Can you give a rule for dividing by a fraction?

632. N. B. Change mixed numbers to improper fractions.

633. Slate Exercises.

Divide:

1. $8 \div \frac{4}{5}$
2. $\frac{2}{3} \div 4$
3. $10 \div \frac{3}{7}$
4. $\frac{9}{16} \div \frac{3}{20}$
5. $\frac{3}{7} \div 10$
6. $\frac{3}{20} \div \frac{9}{16}$
7. $1\frac{3}{4} \div 5$
8. $5 \div 1\frac{3}{4}$
9. $8\frac{2}{9} \div 11$
10. $4\frac{5}{11} \div 17$
11. $24\frac{1}{6} \div 20$
12. $6\frac{3}{4} \div 9$
13. $\frac{4}{11} \div \frac{3}{11}$
14. $\frac{11}{15} \div \frac{4}{15}$
15. $\frac{3}{11} \div \frac{4}{11}$
16. $\frac{4}{15} \div \frac{11}{15}$
17. $3\frac{3}{5} \div \frac{3}{5}$
18. $\frac{4}{7} \div 3\frac{3}{7}$
19. $\frac{4}{11} \div 6\frac{2}{11}$
20. $\frac{11}{24} \div 8\frac{5}{24}$
21. $\frac{1}{6} \div \frac{3}{8}$
22. $\frac{4}{9} \div \frac{5}{6}$
23. $\frac{8}{15} \div \frac{1}{7}$
24. $\frac{9}{16} \div \frac{3}{11}$
25. $8\frac{7}{15} \div 3\frac{4}{7}$
26. $9\frac{7}{9} \div 3\frac{4}{5}$
27. $18\frac{1}{2} \div 11\frac{2}{3}$
28. $15\frac{4}{11} \div 13\frac{3}{5}$
29. $16\frac{1}{4} \div 13\frac{1}{3}$
30. $23\frac{1}{2} \div 6\frac{5}{7}$

634. Perform operations indicated:

31. $(3\frac{2}{3} \times 4\frac{1}{2}) - 10\frac{1}{4}$
32. $(13\frac{2}{9} - 7\frac{2}{3}) \times \frac{3}{4}$
33. $(20 \times \frac{3}{4}) \div \frac{7}{8}$
34. $(20 \div \frac{7}{8}) \times \frac{3}{4}$
35. $20 \div (\frac{7}{8} \times \frac{3}{4})$
36. $(20 \div \frac{7}{8}) \div \frac{3}{4}$
37. $(14\frac{3}{4} \times 7) - (9 \times 10\frac{7}{8})$
38. $(\frac{15}{16} \times \frac{24}{25}) + (4\frac{4}{5} \times 6\frac{7}{8})$
39. $34\frac{5}{8} - 17\frac{5}{6} + 20\frac{17}{24}$
40. $18\frac{5}{9} + 24\frac{7}{12} - 36\frac{17}{36}$
41. $\dfrac{5\frac{2}{3} \times 9 \times 7\frac{3}{5}}{4\frac{3}{5} \times \frac{5}{6}}$
42. $\dfrac{5\frac{1}{2} \times 7\frac{3}{4} \times 3\frac{1}{3} \times 6\frac{1}{4}}{2\frac{3}{4} \times 4\frac{1}{5} \times 31}$

635. Oral Problems.

Give analysis of each :

1. If base-balls are worth $\frac{3}{4}$ of a dollar each, what will be the cost of 16 base-balls?

2. Paid $12 for base-balls, at $\frac{3}{4}$ of a dollar each. How many were bought?

3. What is the cost of 2 feet of ribbon at 30 cents per yard?

4. Find how much a yard of ribbon is worth, if $\frac{2}{3}$ yard costs 20 cents.

5. If it takes $\frac{3}{4}$ yard of material to make one waist, how many can be made from a piece containing 24 yd.?

6. If 18 jackets require 24 yards of cloth, how much is needed for 1 jacket?

7. A man had 60 acres of land. How many acres had he left after selling $\frac{2}{5}$ of his land?

8. After spending $\frac{2}{5}$ of his money, a person had $36 remaining. How much money had he at first?

9. If tea is worth $\frac{3}{4}$ of a dollar per pound, how much can be bought for $\frac{1}{2}$ of a dollar?

10. When tea is $.50 per pound, how much can be bought for $.75?

11. When silk is selling at $.75 per yard, how much can be bought for one-fourth of a dollar?

12. Find the cost of a gallon of milk at the rate of 9 cents for 3 pints.

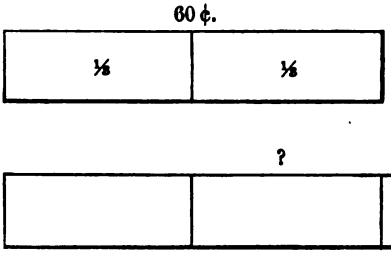
13. $\frac{3}{8}$ of a gal. of milk costs 9¢. What is the price per gal.?

14. $\frac{2}{3}$ of what number is 12?

15. 1 yard and 1 foot of wire cost 16 cents. How much must be paid for a yard?

636. Slate Exercises.

1. Given the cost of two-thirds of a yard at 60 cents, show by a diagram the price of a yard.



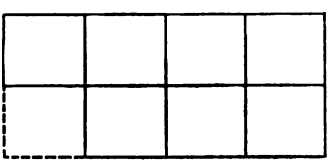
2. Show by a diagram the number of pieces of wire $\frac{3}{8}$ yd. long that can be made from 4 yd. of wire.

3. Show by a diagram that three-fourths of one is equal to one-fourth of three.

4. If $\frac{3}{8}$ of a yd. of material will make an apron, how many half aprons can be made from a yard? Show by a diagram.

5. A boy paid 6 cents for three-eighths of a pie. What would be the cost of the whole pie at the same rate? Make a drawing.

6. Seven-eighths of an acre of land is sold for $140. What is the price of an acre?



637. Worcester Public Schools. — Oral Exercises.

1. What is $\frac{5}{6}$ of 60? $\frac{3}{5}$ of 35?

2. A man sold a boat for $8, which was $\frac{2}{7}$ of what it cost him. What did it cost him?

3. A man having $35, gave away $\frac{2}{7}$ of it. How much had he left?

4. How many inches are there in $\frac{3}{8}$ of a yard? $\frac{3}{4}$ of a yard? $\frac{5}{8}$ of a yard?

5. If 6 eggs cost 12 cents, what will 5 dozen cost?

6. How much is $\frac{5}{8}$ less $\frac{1}{4}$? $\frac{1}{8}$ less $\frac{1}{4}$?

7. Change to improper fractions: $7\frac{4}{7}$, $9\frac{1}{8}$, $6\frac{4}{5}$, $2\frac{8}{15}$, $6\frac{7}{9}$.

8. How many apples at 2¢ apiece are worth as much as 4 peaches at 5¢ apiece?

9. Which is the greater and how much: $\frac{5}{8}$ of \$24, or $\frac{4}{5}$ of \$25?

10. Change to mixed numbers: $\frac{37}{4}$, $\frac{65}{7}$, $\frac{67}{15}$, $\frac{41}{8}$, $\frac{50}{8}$.

11. There are 45 pupils in school and $\frac{4}{9}$ of them are girls. How many are boys?

12. Add $8\frac{1}{4}$ and $7\frac{1}{2}$. $5\frac{2}{3}$ and $7\frac{1}{3}$.

13. If it takes 5 men 15 days to do a piece of work, how long will it take 10 men to do it?

14. What will 2 bushels of corn cost, if $\frac{1}{2}$ peck costs 15 cents?

15. If it costs 25 cents to set one shoe, what will it cost to shoe a span of horses all around?

638. Worcester Public Schools. Written Exercises.

1. What is the sum of 94,625; 215; 5,172; 819,365; 121?

2. Bought 172 acres of land for \$860. What was that an acre?

3. In a class-room there are 54 pupils; each pupil spent \$2.75 for books this year. How much money was spent for books by the whole class?

4. By the census of 1880, Massachusetts had a population of 1,783,085; in 1890, it had a population of 2,238,943. What was the gain?

5. How many boxes of strawberries at $.15 a box can I get for $1.20?

6. What is a proper fraction? An improper fraction? Define numerator, denominator, a mixed number.

7. Add $\frac{1}{8}$, $\frac{5}{6}$, $\frac{2}{3}$, and $\frac{1}{2}$.

8. If 7 pairs of shoes cost $10\frac{5}{8}$, how much will one pair cost?

9. $\frac{4}{7} \div \frac{2}{14} \div \frac{8}{21} = ?$

10. What is the product of $\frac{9}{10}$, $\frac{20}{8}$, $\frac{12}{15}$, and $\frac{25}{30}$?

11. $8\frac{1}{3} \times 7\frac{2}{3} = ?$

12. Paid $\frac{3}{4}$ of a dollar for potatoes, $\frac{4}{5}$ of a dollar for apples, and $\frac{1}{6}$ of a dollar for sugar. How much did I pay for all?

13. Divide $2\frac{1}{3}$ by $1\frac{5}{7}$.

14. Find the difference between $4\frac{2}{3}$ and $3\frac{5}{8}$.

15. $\frac{30}{35} \div \frac{25}{40} \div \frac{5}{16} = ?$

639. Oral Problems.

NOTE. — In dividing one fraction by another mentally, reduce both to a common denominator.

1. $\frac{2}{3}$ yd. cloth costs $\frac{3}{4}$. What is the price per yard?

$\frac{8}{12}$ yd. = $\frac{9}{12}$; 8 yd. = $9.

2. A man owning $\frac{3}{5}$ of a vessel sells $\frac{2}{3}$ of his share. What part of the vessel does he then own?

3. A barrel of flour contains 196 lb. of flour; the barrel weighs 24 lb. What is the weight of both?

4. A family uses $3\frac{1}{2}$ lb. of sugar per day. How long will $24\frac{1}{2}$ lb. last?

5. How much will be the cost of 3 lb. of 25-ct. coffee and 1 lb. butter at 36¢?

6. If $\frac{3}{4}$ of a lb. of candy costs 30¢, what will be the cost of $\frac{7}{8}$ of a lb.? (6 eighths cost 30¢, what will 7 eighths cost?)

7. A tailor has a piece of cloth containing $2\frac{1}{2}$ yd.; he sells $1\frac{3}{8}$ yd. What part of the piece does he sell?

8. How many quarts in 1 bu. 1 pk. and 1 qt.?

9. Reduce $\frac{36}{48}$ to lowest terms.

10. $24\frac{1}{2}$ yards of cloth are used for 7 coats. How many yards in each coat?

11. If cloves are worth 20¢ per $\frac{1}{4}$ lb., how much will be paid for 7 oz.?

12. At 3 oranges for 5¢, what will be the cost of $1\frac{1}{2}$ doz. oranges?

13. My purchase amounts to $1.29. I give the store-keeper a $2 bill. How much change do I receive?

14. Paid $4.86 for 6 bu. of rye. What was the price per bushel?

15. Bought 3 dolls at 49¢ each. Total cost?

16. If 12 hats cost $7, what will be paid for 36 hats?

17. If 2 lb. and 5 oz. butter cost 74 cents, what will be the cost of 3 lb. and 2 oz.?

18. How many bottles holding $1\frac{1}{2}$ pt. will be needed to contain $2\frac{1}{4}$ gallons?

19. A bag of flour contains $\frac{1}{8}$ of a barrel of 196 lb. How many pounds does the bag contain?

20. What will be the cost of a dozen heads of cauliflower at the rate of 2 for 25 cents?

21. Twenty examples are given out. A pupil that correctly answers all, receives 100 per cent. What per cent will a pupil receive that solves 16 examples?

22. A woman receives $40 interest a year. How much does she receive in 3 years and 6 months?

23. A man bought some cows at $35 each, and the same number at $45 each. What was the average price?

24. A girl received 100 per cent in three studies, and 80 per cent in the fourth. What was her average?

25. A square floor contains 144 square feet. How many feet long and wide is it?

26. Mr. Brown mixed 3 pounds of black tea worth 40 cents a pound with 1 pound of 60-cent green tea. What is the mixed tea worth a pound?

640. Slate Problems.

1. A milliner sells 3 pieces of ribbon at 18 cents per yard. They measure $4\frac{2}{3}$ yd., $3\frac{4}{5}$ yd., and $5\frac{5}{12}$ yd., respectively. What is the amount of her bill?

2. How many feet and inches in $\frac{5}{12}$ of a yd.?

3. To make powder, a man mixes $7\frac{1}{4}$ lb. of saltpetre, $1\frac{7}{16}$ lb. of sulphur, and as much charcoal as sulphur. How many pounds of powder will there be?

4. Four men form a partnership; the first furnishes $\frac{1}{9}$ of the capital, the second $\frac{3}{8}$, and the third $\frac{5}{12}$. What fraction of the capital is furnished by the fourth?

5. I pay 15 cents more for a half pound of tea than I pay for a quarter pound of the same tea. What is its price per pound?

6. After doing $\frac{3}{4}$ of a piece of work, a man requires 3 days more to finish it. How many hours does he take to do the whole work if he works 8 hours per day?

7. If 1 lb. 7 oz. coffee cost 46 cents, what will 3 lb. 9 oz. cost?

8. Add 14 days 6 hours 50 minutes and 15 days 17 hours 10 minutes.

9. If a dozen pairs of gloves cost $15.25, what will be the cost of 60 pairs? Cancel.

10. 15 men do a piece of work in $10\frac{2}{3}$ days. How long would it take 5 men to do the same work?

11. To make a cloak 3 yd. of cloth $1\frac{1}{2}$ yards wide are required. How much cloth $\frac{3}{4}$ yd. wide would be required?

12. In 3 years 4 months a gas company manufactures 4,200,000 cubic feet of gas. How many cubic feet are manfactured per year?

13. If $2\frac{2}{3}$ dozen hats cost \$80, what will be the cost of 3 hats?

14. A boy hires a boat at 20 cents per hour. How much has he to pay if he uses it from 20 minutes before 9 A.M. until 10 minutes past 1 P.M.?

15. A and B kill an ox. A takes $\frac{5}{8}$ and B the remainder. If B's share weighs $361\frac{1}{2}$ lb., what is the weight of the ox?

16. A grocer buys 30 dozen eggs at 18 cents per dozen. He sells them at the rate of 15 eggs for 25 cents. What is his profit?

17. How many cents in $\frac{5}{16}$ of a dollar?

18. What fraction of $18\frac{3}{4}$ is $6\frac{2}{3}$? $\quad \frac{6\frac{2}{3}}{18\frac{3}{4}} = ?$

19. A farmer buys a horse for \$140, and sells it at an advance of $\frac{3}{20}$ of the cost. What is the selling price?

20. In 1893, A was 36 years old and B was $1\frac{3}{4}$ times as old. In 1884, B was how many times as old as A?

21. From the sum of $18\frac{7}{10}$ and $25\frac{3}{8}$ take their difference.

22. If $2\frac{3}{4}$ acres of land cost \$220, what will be the cost of $17\frac{7}{8}$ acres? Indicate the work, and cancel.

23. A can do a piece of work in 6 days, B can do it in 6 days, C can do it in 6 days. How long will it take all three working together?

24. Find the value of $\frac{\frac{2}{3} \text{ of } \frac{3}{8} \text{ of } 2\frac{1}{3}}{\frac{1}{2} \text{ of } 3\frac{2}{5}}$.

25. A man sold a horse for $\frac{3}{4}$ of its cost, losing \$40. What did the horse cost him?

FRACTIONAL PARTS OF A DOLLAR.

641. Oral Problems.

1. How many 50-cent base-balls can be bought for $15?

$(15 \div \frac{1}{2})$

2. How many 75-cent base-balls can be bought for $15?

$(15 \div \frac{3}{4})$

3. At 75¢ per lb., how much tea can be bought for $1?

4. How many hats at $1.25 each can be bought for $15?

$(15 \div 1\frac{1}{4})$

5. Paid $16 for coffee at 25¢ per lb. How many pounds were purchased?

6. At $33\frac{1}{3}$¢ per lb., how many pounds of butter can be bought for $32?

7. Find the number of yards of ribbon, at $12\frac{1}{2}$¢ per yd., that will cost $45.

8. At $6\frac{1}{4}$¢ per bar, how many bars of soap will cost $11?

9. If 4 pieces of violet soap are sold for 25¢, how many can be bought for $9?

10. $24 is paid for corn at 75¢ per bu. How many bushels?

11. I spent $30 for lace at $66\frac{2}{3}$¢ per yard. How many yards did I buy?

12. For $36 how many pairs of rubber shoes can be bought at $37\frac{1}{2}$¢ per pair?

13. Oats are $62\frac{1}{2}$¢ per bu. How many bushels will $40 buy?

14. A farmer pays $87\frac{1}{2}$¢ per bu. for seed rye. If his bill amounted to $21, how many bushels did he buy?

15. A store-keeper sold $33 worth of collars, at 16⅔¢ each. How many did he sell?

16. At the rate of 3 for 50¢, how many collars can be bought for $25?

17. Corn is worth 20¢ per can. How many cans will cost $32?

18. Find the cost of 35 yards of cloth, at $1.25 per yard.

19. At $1.25 per yard, how many yards of cloth can be bought for $35?

20. How many pairs of gloves, at $1.75 per pair, will cost $28?

21. When coal is $5.25 per ton, how many tons can be bought for $42?

22. Cost of 16 pairs of shoes at $2.75?

23. 33 jackets at $3.33⅓?

24. 18 yd. cloth at $2.16⅔?

25. Paid $26 for cloth at $2.16⅔ per yard. How many yards did I buy?

26. Find the cost of 16 pairs of skates at $1.87½ per pair.

27. If sheep cost $3.12½ each, how many can I get for $75?

28. How many 25-cent balls can be bought for $8.75?

29. Divide 775 by 25.

30. Divide $8.25 by 75¢.

31. How many square feet are there in a lot 96 ft. long 25 ft. wide?

32. Find the total cost of 32 head of cattle at $75 per head.

33. How much must be paid for 32 cows at $37.50 each?

34. If sheep are worth $3.75 each, how much will a farmer receive for 32 sheep?

35. If a train goes at the rate of 25 miles per hour, how many hours will it take to go 675 miles?

BILLS.

642. NEW YORK, *Oct.* 1, 1894.

MRS. WILLIAM MARTIN,

Bought of GRAY AND WINTER.

	1894					
Aug.	13	44 yd. Carpet	$ .90			
	15	3 Oak Chairs	1.75			
		1 Rocker		12	—	
	19	18 yd. Oil Cloth	.50			
	27	1 Parlor Suit		75	—	
Sept.	19	6 Kitchen Chairs	.75			
		1 Table		4	50	
	26	36 yd. Matting	.33⅓			
						$

1. Copy the above. Supply the missing amounts.

2. John R. Schultz has bought the following goods of Arthur B. Rowe & Co.:

Jan. 3, 1894, 50 lb. of sugar, at 5½¢; 4 lb. of tea, at 62½¢. Jan. 4, 10 lb. of coffee, at 32½¢; 2 bbl. of flour, at $5.75. Jan. 9, 24 bars of soap, at 16⅔¢; 42 lb. of starch, at 8¢.

Make out a bill dated Feb. 1, 1894.

3. Make out a bill for the following articles bought during March and April. Supply the names of buyer and seller, also the dates.

23½ yd. of silk, at 80¢; 1⅜ yd. of lace, at $2.40; 64 yd. of muslin, at 6⅞¢; 8 spools of sewing silk, at 7¢; 4 pr. of stockings, at 65¢; 6 yd. of linen, at 87½¢; ½ doz. collars, at $2.10.

4. Make out a bill for the following goods bought June 15.

3 cases of torpedoes, at $2.20; 12 boxes of fire-crackers, at $1.62½; 3 gross pin wheels, at $1.35; 5 gross sky-rockets, at $3.25; 2 doz. balloons, at $2.25; 45 lanterns, at 9¢.

5. How much will the following goods amount to? Make out the bill.

75 first readers at 15 cents; 48 second readers at 24 cents; 28 third readers at 37 cents; 7 dozen copy-books at 84 cents; 13 geographies at 87 cents; 43 United States histories at 65 cents.

643. United States Civil Service. Female Clerks, Treasury Department.

1. Write in figures the following numbers:

Thirteen thousand twenty-two.

Three hundred one thousand six.

Five hundred seventy-two million six hundred one.

2. Write the numbers expressed by the following figures:

25,601

307,003

2,706,103

572,601,300

3. Add the following:

	$118,248.30
	92,718.50
	150,476.14
	103,880.82
	149,004.15
$311,533.83	175,111.81
194,572.32	193,636.59
14,709.46	269,803.41
118,248.30	315,022.36
92,718.50	205,217.87
150,476.14	379,558.23
	384,720.19
	445,485.18
	464,546.52
	427,124.98
	337,032.62

4. How long will it take 100 women to count $3,000,000 in silver, one-third of which is in 50-cent pieces, one-third in quarters, and the remaining third in dimes, if each woman counts at the rate of 50 pieces per minute?

5. The Treasury Department purchased 756 reams of foolscap paper for $1,784.16; 672 reams of letter paper for $1,518.72; and 345 reams of note paper for $741.75. What did the whole cost, and how much was paid per ream for each kind?

6. How many dollars in greenbacks can fifty presses print in one hour, if each press prints 30 impressions of paper per minute, and each impression contains 12 notes of the denomination of $5?

644. Letter-Carriers.

1 and 2. Same as in the examination for *Porters*. (Art. 487.)

3. If one letter-carrier handles 302,679 pieces of mail matter in one year, how many pieces will 3,074 carriers handle in the same time?

4. The whole number of pieces of mail matter handled at 112 post-offices was 1,143,518,880. What was the average number of pieces for each office?

5. What is the difference between $5,040 and $11,070.30?

6. Write in figures: Twenty thousand one hundred dollars and two cents.

7. A letter-carrier is paid at the rate of $800 a year of 365 days. If he serves as carrier 146 days, how much will he have earned in that time?

8. The Post-Office Department purchased 265 reams of manilla paper at $1.65 per ream, and 320 reams of note paper at $1.07 per ream. What was the total cost of the purchase, and the average price per ream?

645. Questions from United States Civil Service Examinations.

1. There are in the library of a certain school 683 books, which number will give 23 books to each pupil and leave 16 books over. What is the number of pupils?

2. To $\frac{3}{5}$ of $\frac{3}{4}$ add $\frac{1}{2}$ of $\frac{7}{10}$ and reduce to lowest terms.

3. Write in figures: One million twenty thousand three dollars and five cents.

4. The Post-Office Department bought 126 reams of paper; $\frac{5}{8}$ of it was at \$2.20 a ream, and the remainder at \$1.75 a ream. What did the whole cost?

5. Multiply $10\frac{2}{3}$ by $7\frac{1}{8}$ and divide the product by $9\frac{1}{2}$, expressing the result in lowest terms.

6. Add together $\frac{5}{6}$, $\frac{6}{8}$, and $\frac{3}{4}$ of $\frac{1}{16}$.

7. Subtract $\frac{3}{5}$ of $\frac{10}{12}$ of $1\frac{2}{3}$ from the sum of $\frac{1}{3}$ and $\frac{9}{10}$.

8. Multiply $\frac{4}{5} - \frac{1}{3}$ by $\frac{3}{10}$ of $\frac{20}{27}$ of $7\frac{1}{2}$.

9. How many times will $\frac{1}{3}$ of a barrel of $41\frac{1}{3}$ gallons fill a vessel that holds $\frac{5}{6}$ of a gallon?

10. If $\frac{3}{16}$ of a ton is worth $\$9\frac{1}{7}$, what are $2\frac{5}{8}$ tons worth?

CANCELLATION.

646. Oral Exercises.

1. Multiply 22 by 12 and divide the product by 3. Cancel.

2. 45 times 15 divided by 9 = ?

3. If 18 hats cost \$10, what will 36 cost?

4. Find the cost of 3 dozen pencils at \$2.40 per gross.

5. At 3 for 5¢, how many peaches can I get for 25¢?

647. Sight Exercises.

1. $\frac{36 \times 14}{9}$	5. $\frac{42 \times 23}{21}$	9. $\frac{67 \times 36}{18}$	13. $\frac{83 \times 36}{12}$
2. $\frac{37}{8} \times 16$	6. $\frac{4}{23} \times 46$	10. $\frac{32}{41} \times 82$	14. $\frac{15}{16} \times 48$
3. $12 \times \frac{43}{24}$	7. $32 \times \frac{67}{96}$	11. $4 \times \frac{93}{12}$	15. $15 \times \frac{87}{30}$
4. $\frac{25 \times 18}{36}$	8. $\frac{33 \times 12}{99}$	12. $\frac{89 \times 13}{26}$	16. $\frac{44 \times 17}{34}$

648. Visitors to Prospect Park.

Month.	Carriages.	Equestrians.	Pedestrians.	Sleighs.	Totals.
January	43,398	1,953	408,230	6,680	
February	112,140	8,032	485,990	16	
March	128,520	12,027	526,270		
April	120,240	8,827	655,925		
May	359,621	15,805	1,944,353		
June	208,096	14,687	1,233,873		
July	220,860	5,575	1,443,173		
August	260,516	9,578	1,640,651		
September	333,639	11,926	1,704,611		
October	421,220	16,246	1,699,851		
November	316,020	15,324	1,268,101		
December	174,256	12,157	719,569		
Total					
Monthly average					
Daily average					

In the foregoing table find the total number of visitors for each month, the number of visitors by carriage for the year, the number of equestrians and pedestrians, the number by sleighs, together with the grand total for the year. Find also the daily and the monthly average.

SHORT METHODS.

649. Oral Problems.

1. Multiply by 25:

16, 19, 21, 23, 25, 29, 33, 36, 42, 48.

2. How many square feet in a lot 84 ft. long, 25 ft. wide?

3. What is the weight of 25 bbl. of flour, each weighing 196 lb.?

4. Find the cost of 25 lb. of coffee at 32¢ per lb.

5. What will a woman have to pay for 25 yd. of silk at $1.60 per yd.?

6. A man sold 25 cows at $44 each. How much did he receive for them?

7. Multiply 64 by $12\frac{1}{2}$.

8. Find the cost of $12\frac{1}{2}$ bu. of wheat at 96¢ per bushel.

9. At $12.50 per bbl., how much would I have to pay for 56 bbl. of pork?

10. How many pens in $12\frac{1}{2}$ gross? (144 to gross.)

11. Find the cost of $12\frac{1}{2}$ lb. of tea at 56¢ per lb.

12. How many square yards in a field 96 yards long 75 yards wide?

650. Blackboard Exercises.

Write only the answers:

1. 837×25	8. $25 \times 2{,}174$	15. $12\frac{1}{2} \times 1{,}084$
2. 763×25	9. 837×250	16. $12\frac{1}{2} \times 2{,}196$
3. 934×25	10. 763×250	17. $12\frac{1}{2} \times 3{,}670$
4. 508×25	11. $864 \times 12\frac{1}{2}$	18. $12\frac{1}{2} \times 6{,}281$
5. 25×686	12. $776 \times 12\frac{1}{2}$	19. 864×125
6. 25×301	13. $236 \times 12\frac{1}{2}$	20. 776×125
7. $25 \times 1{,}039$	14. $404 \times 12\frac{1}{2}$	21. $125 \times 1{,}020$

651. Add $15\frac{2}{3}$ and $8\frac{3}{5}$.

Adding $\frac{2}{3}$ and $\frac{3}{5}$ $\left(\text{or } \frac{10+9}{15}\right)$, we get $1\frac{4}{15}$. Write $\frac{4}{15}$ and carry 1.

22. $34\frac{1}{2} + 15\frac{7}{10}$
23. $42\frac{3}{5} + 19\frac{4}{5}$
24. $84\frac{2}{3} + 18\frac{3}{4}$
25. $40\frac{4}{7} + 16\frac{1}{2}$
26. $15\frac{5}{6} + 32\frac{2}{5}$
27. $35\frac{2}{3} + 20\frac{1}{8}$
28. $12\frac{3}{5} + 41\frac{1}{3}$
29. $25\frac{1}{4} + 46\frac{8}{9}$
30. $57\frac{5}{8} + 17\frac{3}{5}$
31. $29\frac{2}{3} + 84\frac{1}{2}$
32. $68\frac{7}{9} + 13\frac{5}{6}$
33. $74\frac{5}{12} + 18\frac{7}{8}$
34. $37\frac{1}{2} + 60\frac{5}{7}$
35. $13\frac{5}{6} + 81\frac{1}{4}$

652. Write answers:

36. $57\frac{1}{2} - 18\frac{2}{5}$
37. $98\frac{5}{6} - 56\frac{1}{2}$
38. $46\frac{3}{4} - 19\frac{2}{3}$
39. $67\frac{5}{8} - 8\frac{1}{6}$
40. $74\frac{5}{9} - 40\frac{1}{4}$
41. $57\frac{2}{5} - 18\frac{1}{2}$
42. $98\frac{1}{2} - 56\frac{5}{6}$
43. $37\frac{2}{3} - 29\frac{1}{5}$
44. $58\frac{6}{11} - 50\frac{1}{3}$
45. $24\frac{2}{7} - 6\frac{1}{4}$
46. $90\frac{7}{10} - 18\frac{2}{3}$
47. $65\frac{11}{16} - 9\frac{1}{4}$
48. $37\frac{1}{5} - 29\frac{2}{3}$
49. $24\frac{1}{4} - 6\frac{2}{7}$

653. Multiply $18\frac{3}{4}$ by 4.

$\frac{3}{4} \times 4 = 3$. 4 eights are 32, and 3 are 35 (put down 5). 4 ones are 4 and 3 are 7. *Ans.* 75.

50. $27\frac{1}{2} \times 10$
51. $33\frac{1}{3} \times 12$
52. $16\frac{5}{8} \times 8$
53. $17\frac{3}{4} \times 8$
54. $19\frac{3}{5} \times 6$
55. $15\frac{7}{8} \times 3$
56. $13\frac{4}{5} \times 4$
57. $20\frac{1}{2} \times 11$
58. $40\frac{2}{3} \times 5$
59. $16\frac{3}{4} \times 7$
60. $37\frac{1}{2} \times 3$
61. $45\frac{3}{5} \times 5$
62. $23\frac{1}{3} \times 4$
63. $17\frac{1}{8} \times 6$

654. Do not change dividends to improper fractions.

64. $3)45\frac{3}{7}$

65. $4)56\frac{1}{3}$

66. $12)36\frac{1}{3}$

67. $5)72\frac{1}{2}$

68. $11)83\frac{3}{5}$

69. $8)37\frac{1}{2}$

70. $9)48\frac{1}{4}$

71. $6)25\frac{1}{5}$

72. $7)10\frac{1}{4}$

73. $6)75\frac{3}{5}$

74. $7)97\frac{3}{10}$

75. $10)87\frac{1}{2}$

76. $4)66\frac{3}{4}$

77. $3)94\frac{1}{8}$

MULTIPLICATION OF DECIMALS.

655. Oral Exercises.

3 and a decimal multiplied by 2 and a decimal gives *about* what product?

$44.02 \times 2.05 =$ about what?

656. Slate Exercises.

Multiply:

1. 32×2.5
2. 3.2×25
3. 6.4×4.5
4. 7.2×3.75
5. 12.8×5.7
6. 9.6×1.125
7. 34.9×2.34
8. 5.625×8.4
9. 1.875×12.8
10. 42.36×2.95

657. In multiplying 32 by 2.5, how many decimals are pointed off in the product? In multiplying 3.2 by 2.5, how many are pointed off? How many are pointed off in the product of 9.6 by 1.125?

658. Can you tell the relation the number of decimal places in the product bears to the number in the multiplier and in the multiplicand?

$\frac{7}{10} \times \frac{7}{10} = ?$ $.7 \times .7 = ?$ $.1 \times .1 = ?$ $.1 \times .01 = ?$

11.	1.75×64	**16.**	18.4×20.25
12.	8.375×40	**17.**	11.16×42.40
13.	24.5×18.2	**18.**	$66.6 \times 3.3\frac{1}{3}$
14.	$9.6 \times 12\frac{1}{2}$	**19.**	6.24×1.75
15.	7.43×3.6	**20.**	400.04×39.25

DIVISION OF DECIMALS.

659. Divide 42 by 2.1.

Changing the decimal fraction in the divisor to a common fraction, we have

$$42 \div 2\tfrac{1}{10} = \tfrac{42}{1} \div \tfrac{21}{10} = \tfrac{42}{1} \times \tfrac{10}{21} = \tfrac{420}{21}.$$

$$42 \div 2.1 = 420 \div 21.$$

660. When we change the divisor 2.1 to 21, we have multiplied it by 10, and the same change must be made in the dividend.

661. In the following examples, make each divisor a whole number by removing the decimal point, and make a corresponding change in the dividend.

662. Divide:

21.	$80 \div 2.5$	**30.**	$72 \div .5$
22.	$8 \div 2.5$	**31.**	$960 \div .03$
23.	$840 \div 1.2$	**32.**	$.847 \div .007$
24.	$36 \div \frac{9}{10}$	**33.**	$27 \div .002$
25.	$36 \div .9$	**34.**	$10 \div .8$
26.	$12.6 \div 6.3$	**35.**	$1.263 \div .03$
27.	$48 \div 15$	**36.**	$196.3 \div .013$
28.	$18.36 \div .6$	**37.**	$19.63 \div .013$
29.	$50 \div .25$	**38.**	$1.963 \div .013$

663. Remove the decimal point in the divisor three places to the right, and make a corresponding change in the dividend, adding two ciphers.

To show where the decimal point originally belonged, it may be enclosed in a small circle, instead of being erased.

Ans. 15 100.

$\odot 013.)\overline{196\odot 300.}$

66

13

00

When the divisor is thus made a whole number, the decimal point in the quotient will be placed under (or over) the new decimal point in the dividend.

$1.736 \div 16$	$17.36 \div .16$	$.01736 \div 1.6$
.1085 *Ans.*	108.5 *Ans.*	.01085 *Ans.*
$16)\overline{1.736}$	$\odot 16.)\overline{17\odot 36.}$	$1\odot 6.)\overline{\odot 0.1736}$
136	136	136
80	80	80

39.	$.504 \div .024$	**47.**	$392 \div 3.2$
40.	$5.04 \div .24$	**48.**	$48 \div 3{,}000$
41.	$50.4 \div 2.4$	**49.**	$92 \div .23$
42.	$504 \div 24$	**50.**	$.875 \div 125$
43.	$168 \div .7$	**51.**	$381.17 \div 8.11$
44.	$36 \div .12$	**52.**	$.624 \div 9.75$
45.	$.875 \div .25$	**53.**	$48.195 \div 3.57$
46.	$123.6 \div .01$	**54.**	$829.31 \div .019$

664. Divide 381.6 by 95.032.

$$95\odot 032.)\overline{381\odot 600.}\ 4.015+$$

147200

521680

The sign (+) after the last figure of the quotient indicates that there is a remainder.

665. Divide, carrying out the quotient to 3 places of decimals:

55.	$31 \div 13$	**58.**	$7.049 \div 1.6$
56.	$4.5 \div 17$	**59.**	$81.22 \div 3.275$
57.	$920.07 \div 46$	**60.**	$246.3 \div 93.473$

666. Sight Exercises.

Write answers at sight:

1. $.042 \times 200$	5. $40 \times .7$	9. $.121 \times 4{,}000$
2. $.13 \times 300$	6. $25 \times .08$	10. $.061 \times 500$
3. $.014 \times 50$	7. $.234 \times .2$	11. $.03 \times 1{,}000$
4. 8.1×60	8. $.73 \times 30$	12. $.012 \times 700$

667. Remember that $369 \div 1{,}000 = \frac{369}{1000} = 369$ thousandths $= .369$; that $219 \div 100 = 2.19$; and that $6 \div 100 = .06$.

13. $369 \div 3{,}000$	17. $2{,}460 \div 3{,}000$	21. $4.68 \div 20$
14. $219 \div 300$	18. $196 \div 4{,}000$	22. $30.5 \div 500$
15. $48.6 \div 60$	19. $6 \div 500$	23. $18.8 \div 200$
16. $1.89 \div 90$	20. $27.9 \div 300$	24. $248 \div 4{,}000$

668. Slate Exercises.

Cancel the ciphers in the divisor, and remove the decimal point in the dividend a corresponding number of places to the left, prefixing ciphers if necessary.

1. $1{,}728 \div 1{,}200$

$12\not{0}\not{0})17.28_{\odot}$

1.44 *Ans.*

2. $172.8 \div 1{,}200$

$12\not{0}\not{0})1.72_{\odot}8$

.144 *Ans.*

3. $1.728 \div 1{,}200$

$12\not{0}\not{0})\,.01_{\odot}728$

.00144 *Ans.*

4. $2{,}436 \div 3{,}000$	10. $45 \div 800$
5. $136.5 \div 1{,}300$	11. $25.2 \div 240$
6. $84.8 \div 80$	12. $345.6 \div 1{,}200$
7. $100.1 \div 700$	13. $4{,}004 \div 110$
8. $1 \div 40$	14. $5.28 \div 60$
9. $2.2 \div 50$	15. $907.5 \div 1{,}500$

SIGHT APPROXIMATIONS.

669. Give approximate answers. Whole numbers.

1. $17\frac{3}{10} \times 3\frac{8}{90}$; or, about $17 \times$ about 4.
2. $25\frac{1}{16} \div \frac{24}{95}$; or, about $25 \div \frac{1}{4}$ nearly.
3. $6\frac{1}{8} \times 6\frac{1}{8}$
4. $300\frac{1}{25} \div 11\frac{86}{87}$
5. $86\frac{2}{3} \times \frac{71}{72}$
6. $35\frac{7}{8} \div 3\frac{19}{20}$
7. $799\frac{31}{32} \div 99\frac{15}{16}$
8. $7\frac{99}{100} \times 7\frac{9}{10}$
9. $7\frac{1}{3} \times 11\frac{1}{13}$
10. $64\frac{1}{86} \times \frac{3}{8}$

670. Give answers in whole numbers:

1. 8.75×9.999; or, 8.75×10 nearly.
2. $24.002 \div .4999$; or, $24 \div$ nearly $\frac{5}{10}$, or $\frac{1}{2}$.
3. 25.125×11.834
4. $36.843 \div 6.105$
5. $86.4 \div .983$
6. 32.04×5.001
7. $799.9 \times .103$
8. 7.999×7.999
9. 7.001×12.003
10. $64.001 \div .249$

671. Give the cost, approximately, of:

1. 49 horses at \$199 each. ($\$200 \times 49$.)
2. 199 yd. 2 ft. 11 in. of cloth at \$2.50 per yard.
3. 3 lb. 15 oz. of butter at 25¢ per lb.
4. 398 coats at \$12 each.
5. 7 bu. 3 pk. 7 qt. potatoes at \$2 per bushel.
6. 798 base-balls at 25 cents each.
7. 19 gal. 3 qt. 1 pt. alcohol at \$2.49 per gallon.
8. 995 lb. tea at $59\frac{3}{4}$ cents per pound.
9. 7 houses at \$4,995 each.
10. 597 pounds of hay at 99 cents per 100 pounds.

672. Slate Problems.

1. Find the cost of 18,756 ft. of lumber at $30 per 1,000 ft.

2. A field is 14.25 rods long by 7.4 rods wide. What is its area in square rods?

3. A rod is 16.5 feet. How many rods are there in 231 feet.?

4. How many marks are there in $100? (A mark is equal to 23.8 cents.)

5. Add 3 and 4 tenths, 96 thousandths, 100 and 5 thousandths, 27 hundredths.

6. From 2,700 take 27 hundredths.

7. Multiply 8 and 4 tenths by 9 and 25 hundredths.

8. Divide 96 and 75 hundredths by 322 and 5 tenths.

9. A load of hay, at 75 cents per 100 pounds, cost $13.98. What was the weight of the hay?

10. The circumference of a circle is 3.1416 times the diameter. How many inches in circumference is a circle whose diameter is 20 inches?

673. Wilmington, Del., Public Schools. Examination Questions.

1. Show by drawings that $\frac{1}{3} = \frac{4}{12}$, and that $\frac{3}{4} = \frac{6}{8}$.

2. Write the first five prime numbers that are greater than 7.

3. Find the greatest common divisor of 1,220 and 2,013.

4. Find the least common multiple of 12, 15, 14, 6, 21, 21, and 24.

5. Find the prime factors of 1,140.

6. Add $3\frac{1}{2}$, $\frac{3}{8}$, $\frac{5}{7}$, and $\frac{2}{3}$ of $7\frac{1}{2}$.

7. From $14\frac{7}{16}$ pounds of butter, $5\frac{3}{4}$ pounds were sold to one person and $3\frac{7}{8}$ to another. How much remained?

8. A man bought 4 bushels of corn for $3\frac{3}{8}$ dollars. What fraction of a dollar did one bushel cost?

9. If $\frac{3}{8}$ of a bushel of oats will last a horse one day, how long will $4\frac{1}{2}$ bushels last?

10. In two months Ann will be 15 years old. How old was she nine months ago?

11. A boy has to walk from his home to a house $1\frac{3}{4}$ miles east of his home, and from there to a place $2\frac{1}{2}$ miles west of his home. How far has he to walk?

12. I lost $\frac{4}{5}$ of my money, then found $\frac{3}{4}$ of what I had lost, and then had 64 cents. How much had I at first?

13. Quotient $24\frac{1}{2}$, divisor $3\frac{1}{7}$. What is the dividend? The product is $2\frac{2}{5}$, and one factor is $\frac{3}{8}$. What is the other factor?

14. Bought $3\frac{1}{4}$ yards of muslin at 7 cents a yard, $5\frac{1}{2}$ yards of ribbon at $3\frac{1}{2}$ cents a yard, and $2\frac{1}{8}$ yards of cloth at $\$1.75$ per yard, and gave a ten-dollar note in payment. How much change should I receive?

15. Write seven million nine thousand nineteen.

674. Philadelphia Public Schools. Oral Work.

1. $50 - 12 - 9 - 19 =$

2. 72 — 7 times 9 = what number?

3. 45 is how much less than 5 times 12?

4. $(\frac{3}{4}$ of $80) + 25 =$

5. $(35 + 15) - (14 \div 9) =$

6. $\frac{6}{9}$ = how many sixths?

7. $2\frac{1}{2}$ = how many fourths?

8. Write the exact divisors of 20.

9. Write the three factors of 30.

10. $\frac{1}{3}$ and $\frac{1}{2} = \frac{1}{6}$.

11. Add $1\frac{3}{4}$ and $\frac{1}{2}$.

12. From $\frac{7}{8}$ take $\frac{1}{4}$.

13. $2\frac{1}{2} + \frac{1}{3} - \frac{1}{4} =$

14. At 12 cents a dozen, what will a gross of buttons cost?

15. How many inch cubes will exactly cover a square foot of surface?

16. What does $\frac{3}{4}$ of anything mean?

17. 1 gallon 2 quarts and 1 gallon 1 quart are how many quarts?

18. If 4 yards of muslin cost 48 cents, how much will one-third of a yard cost?

675. Written Work.

1. Write in figures: seventy thousand twenty-four, four hundred thousand three hundred six, nine thousand fourteen, two million fifty thousand four hundred nine.

2. Multiply 7,089 by 709.

3. Add 456,789; 798; 7,657; 96,754; 8,765; 89; and 789,056.

4. Divide 8,080,412 by 867.

5. From a piece of muslin containing 33 yards, there were sold to one lady $12\frac{1}{2}$ yards, to another $9\frac{3}{4}$ yards, and to another $8\frac{1}{8}$ yards. How many yards were in the remnant?

6. A barrel had in it 22 gal. 3 qt. of oil, and 8 gal. 1 qt. more were poured in. How much then had it in? What was it worth at 10 cents a quart?

7. At 9 o'clock a man started to walk to a town 15 miles distant. If he moves at the rate of 4 miles an hour, how far from the town will he be at half-past 12 o'clock? Draw a diagram to explain your work.

8. Suppose you sell to-day to Edward Wilson of this city, 3 lb. coffee at 30 cents, 9 lb. sugar at 6 cents, $\frac{1}{2}$ lb. tea at 60 cents, 2 doz. lemons at 2 cents each, and 18 eggs at 24 cents a dozen. Make out and receipt the bill.

REVIEW.

676. In comparing two fractions, reduce both to a common denominator. Change denominate numbers to same denominate unit.

677. Oral Exercises.

1. What part of $\frac{7}{15}$ is $\frac{8}{15}$? (What part of 7 is 3?)
2. $\frac{1}{5}$ is what part of $\frac{7}{15}$?
3. What part of $2\frac{1}{2}$ is $\frac{1}{2}$?
4. 3 pt. is what part of a gallon? (3 pt. is what part of 8 pt.?)
5. What part of a gallon is 1 qt. 1 pt.?
6. Divide $\frac{2}{3}$ by $\frac{3}{5}$. (Divide 10 fifteenths by 9 fifteenths.)
7. Divide $\frac{3}{5}$ by $\frac{2}{3}$.
8. How many sq. ft. in a rectangle 12 ft. long, 13 ft. wide?
9. $\frac{1}{5}$ of a day is how many hours and minutes?
10. 14 ounces is what part of 2 pounds?
11. $\frac{3}{4}$ ft. is what part of a yard?
12. A strip of tape 3 yards long is cut into four equal pieces. How many feet and inches in each piece?
13. At \$30 per month, how much rent will I pay in 1 year, 8 months?
14. $2\frac{1}{4}$ months is what part of a year?
15. At $\frac{3}{5}$ of a dollar per lb., how much tea can I get for \$1?
16. How many sq. yd. in a room 15 ft. long, 18 ft. wide?
17. A lot is 25 ft. by 100 ft. How many feet of fence will it take to enclose it?
18. 1 pk. 1 qt. is what part of a bushel?
19. 15 is what part of 4 dozen?
20. Reduce $\frac{56}{84}$ to lowest terms.

DENOMINATE NUMBERS.

678. Slate Exercises.

1. Add 4 days 6 hours, 9 days 11 hours, 3 days 7 hours.

2. What part of a week is 1 day 18 hours?

3. If a man receives $60 interest per year, how much will he receive in 3 years $7\frac{1}{2}$ months?

4. Reduce 3 days 18 hours to minutes.

5. How many days and hours are there in 8,100 min.?

6. $\frac{75}{100}$ of a day is how many hours?

7. How many hours and minutes in .4 day?

8. A man receives $1,460 per year of 365 days. What is his salary per week?

9. Find the cost of 1 bu. 1 pk. 1 qt. of potatoes at 8 cents per half-peck.

10. A piece of meat weighing 27 lb. 12 oz. is divided among 6 persons. How many pounds and ounces does each receive?

11. How many bu., pk., and qt., are there in 5 bags, each containing 1 bu. 1 pk. 1 qt.?

12. How many gallons, quarts, and pints of ice-cream will be needed to give a half-pint to each one of 67 persons?

13. Find the cost of 7 lb. 10 oz. of tea at 40 cents per lb.

14. From a pile of 20 bu. wheat there were sold 10 bu. 3 pk. 7 qt. How much remained?

679. Long Measure.

12	inches (in.)	1 foot (ft.)
3	feet	1 yard (yd.)
$5\frac{1}{2}$	yards	1 rod (rd.)
320	rods	1 mile (mi.)

15. How many yards in a mile? How many feet? How many inches?

16. A field is 16 rods long, 12 rods wide. How many square yards does it contain? How many rods of fence will be needed to enclose it? How many feet?

17. How many rails each 30 feet long will be needed for a single track road (two tracks) 40 miles long?

18. A boy steps 33 inches. How many steps will he take in going 2 miles?

19. Dec. 20 the sun rises at Boston at 7.26 A.M. and sets at 4.30 P.M. How long is it between sunrise and sunset? How much longer is the day at Charleston, S. C., where the sun rises at 6.58 A.M. and sets at 4.57 P.M.?

20. On June 21 the sun rises at Boston at 4.23 A.M. and sets at 7.40 P.M. On the same day it rises at Charleston at 4.53 A.M. and sets at 7.11 P.M. What is the length of the day at each place?

Change:

21. 17 lb. and 4 oz. to ounces.

22. 84 tons and 1,560 lb. to pounds.

23. 37 gal. and 3 qt. to quarts.

24. 45 gal. to pints.

25. 63 qt. and 1 pt. to pints.

26. 27 bu. and 3 pk. to pecks.

27. 48 pk. and 7 qt. to quarts.

28. 84 pk. to pints.

29. 27 mi. to yards.

30. 16 rd. and 3 yd. to yards.

31. 15,000 min. to days, etc.

32. 25,124 lb. to tons, etc.

33. 1,650 ft. to rods.

34. 876 pt. to gallons and quarts.

35. 228 in. to yards and feet.

36. 1,650 rods to miles and rods.

37. 864 hours to weeks and days.

38. 296 qt. to bushels and pecks.

39. 315 oz. to pounds and ounces.

40. 743 months to years and months.

41. 3 ft. 6 in. + 9 ft. 5 in. + 12 ft. 3 in.

42. 30 min. 15 sec. + 30 min. 18 sec. + 45 min. 24 sec.

43. 9 yr. 3 mo. + 18 yr. 7 mo. + 22 yr. 2 mo.

44. 19 wk. 4 da. + 7 wk. 5 da. + 8 wk.

45. 9 mi. 169 rd. + 84 rd. + 3 mi. 67 rd.

46. 7 yd. 1 ft. + 33 yd. + 19 yd. 2 ft.

47. 18 gal. 1 qt. + 16 gal. 2 qt. + 15 gal. 3 qt.

48. 5 pk. 3 qt. + 6 qt. + 7 pk. 1 qt.

49. 24 bu. 3 pk. + 24 bu. 3 pk. + 24 bu. 3 pk.

50. 12 qt. 1 pt. + 12 qt. 1 pt. + 12 qt. 1 pt. + 12 qt. 1 pt.

51. 12 qt. 1 pt. × 4.

52. 24 bu. 3 pk. × 3.

53. 5 pk. 3 qt. × 9.

54. 18 gal. 1 qt. × 8.

55. 33 yd. 1 ft. × 6.

56. 9 mi. 25 rd. × 7.

57. 15 wk. 3 da. × 5.

58. 7 yr. 3 mo. × 10.

59. 40 min. 35 sec. × 2.

60. 9 ft. 5 in. × 12.

61. 25 ft. − 18 ft. 7 in.

62. 50 min. 13 sec. − 27 min. 30 sec.

63. 12 yr. 1 mo. − 5 yr. 11 mo.

64. 50 wk. 4 da. − 18 wk. 6 da.

65. 15 mi. − 8 mi. 143 rd.

66. 33 yd. 1 ft. — 18 yd. 2 ft.

67. 240 gal. 1 qt. — 94 gal. 2 qt.

68. 83 pk. 3 qt. — 59 pk. 1 qt.

69. 170 bu. 1 pk. — 85 bu. 2 pk.

70. 135 qt. 1 pt. — 67 qt. 1 pt.

71. 87 qt. ÷ 2.

72. 50 min. 35 sec. ÷ 5.

73. 156 yr. 9 mo. ÷ 9.

74. 73 wk. 2 da. ÷ 3.

75. 50 mi. 135 rd. ÷ 7.

76. 253 yd. 1 ft. ÷ 10.

77. 387 gal. ÷ 6.

78. 222 bu. 3 pk. ÷ 9.

79. 150 qt. ÷ 4.

80. 75 bu. ÷ 8.

81. 87 qt. ÷ 43 qt. 1 pt.

82. 50 min. 35 sec. ÷ 10 min. 7 sec.

83. 78 bu. ÷ 9 bu. 3 pk.

84. 5 lb. 1 oz. ÷ 9 oz.

85. 14 ft. 2 in. ÷ 1 ft. 5 in.

MEASUREMENTS.

680. How many square yards in a room 6 yards long, 5 yards wide?

How many square yards in a room 18 feet long, 15 feet wide?

681. Slate Exercises.

Calculate the number of square yards in the following. First reduce each side to yards.

1. 18 yd. by 21 yd.
2. 54 ft. by 63 ft.
3. 72 in. by 108 in.
4. 19 yd. by 47 yd.
5. 67 yd. by 89 yd.
6. 33 ft. by 36 yd.
7. 27 ft. by 96 ft.
8. 54 ft. by 72 in.
9. 48 ft. by 45 ft.
10. 54 in. by 72 ft.

682. First, indicate the operations; then cancel.

11. Find the number of square yards in a room 18 ft. 4 in. long, 22 ft. 6 in. wide.

$$18 \text{ ft. } 4 \text{ in.} = 18\tfrac{1}{3} \text{ ft.} = \frac{18\frac{1}{3}}{3} \text{ yd.} = \frac{55}{9} \text{ yd.}$$

$$22 \text{ ft. } 6 \text{ in.} = 22\tfrac{1}{2} \text{ ft.} = \frac{22\frac{1}{2}}{3} \text{ yd.} = \frac{45}{6} \text{ yd.}$$

$$\text{Area} = \frac{55}{9} \times \frac{45}{6} \text{ sq. yd.} \quad \text{Canceling,} \quad \frac{55 \times \overset{5}{\cancel{45}}}{\cancel{9} \times 6} = \frac{275}{6} = 45\tfrac{5}{6} \text{ sq. yd.}$$

12. How many square yards in a room 13 ft. 1 in. long, 27 ft. wide?

$$13 \text{ ft. } 1 \text{ in.} = 157 \text{ in.} = \frac{157}{36} \text{ yd.} \quad 27 \text{ ft.} = 9 \text{ yd.}$$

$$\text{Area} = \left(\frac{157}{36} \times 9\right) \text{ sq. yd.} \qquad \frac{157 \times \cancel{9}}{\underset{4}{\cancel{36}}} = \frac{157}{4} = 39\tfrac{1}{4} \text{ sq. yd.}$$

13. How many square inches in 12 panes of glass, each 5 inches long, 7 inches wide?

14. A piece of cloth is 48 yards long, 24 inches wide. How many square yards does it contain?

15. A merchant imports 8 pieces of cloth, 36 yards to the piece. How many square yards of cloth are there, if it is 32 inches wide?

16. A board fence 6 feet high surrounds a lot 25 feet front by 100 feet deep. How many square feet of boards in the front fence? In the back fence? In each side fence? In the whole? (Make diagrams.)

17. A room is 18 feet long, 15 feet wide, 12 feet high. How many square feet in the floor?

Draw a rectangle to represent the ceiling. Write the dimensions in their proper places, and write in the centre the number of square feet in its surface. Draw diagrams of the four walls; give dimensions and surface of each.

18. How many faces has a cube? If one edge of a cube measures 4 inches, how many square inches in the entire surface?

Suppose you wish to make a cube out of a single piece of pasteboard. Make a drawing to show the shape of the piece needed, without allowing anything for overlapping parts.

19. The United States government charges a duty of 4¢ per square yard on imported cotton cloth. What duty must the importer pay on a piece containing 24 yards, $\frac{3}{4}$ yd. wide?

20. What will be the cost at $1 per square yard for flagging a sidewalk 12 feet wide and 30 feet long?

683. Boston Examination Questions. Mental.

1. A bushel of nuts was sold for 5¢ per quart. How much money did it bring?

2. How many days in the summer months, June, July, and August?

3. John had 40 cents. After earning 24 more, he spent his money for marbles at 4 cents each. How many did he buy?

4. George was sent to the store with 50¢. He bought 6 lb. of rhubarb at 2¢ a pound and two bunches of radishes at 5¢ a bunch. How much money had he left?

5. At $10 a ton what will be the cost of 1,000 pounds?

6. There are 16 rooms in a building with 50 desks in a room. How many desks in all?

7. Edgar earned $2.75 one week, and $2.50 the next week. How much did he earn in both weeks?

8. $6 is $\frac{3}{4}$ of how many dollars?

9. Charles began work at 2 : 45 P.M. and stopped at 5 : 15 P.M. How long did he work?

10. $29 + 18 + 30 + 9 + 8 + 7 = ?$

11. $\frac{1}{3}$ of 22 is how many times 4?

12. Bought a horse for $45 and a saddle for $35, and then sold them, gaining $20. For how much were they sold?

13. Add these numbers: 12, 15, 9, 13, 11, 7, and 24.

14. If you buy 6 yd. of tape at 7 cents a yard, and 4 yd. of silk at 7 dollars a yard, what will you give for both tape and silk?

15. Bought 8 firkins of butter for $72, and gave 6 of them for 7 yd. of cloth. What was a yard of the cloth worth?

16. Bought 5 yd. of ribbon at 16¢, and 3 yd. of linen at 75¢, and gave a two-dollar bill. What was my change?

17. If 7 yd. cost 84¢, how many yards can be purchased for $1?

18. If 6 oranges cost 15¢, how much will 8 cost?

19. 1½ pecks of peanuts cost $0.48; what will one quart cost?

20. Two boys walked in opposite directions; one walked 5 miles an hour, the other 4 miles an hour. How far apart were they in six hours?

21. If ⅜ of a yard of cloth cost 6¢, how much cloth can be bought for 40¢?

22. At ½ a dollar per day for board, how many days' board can you get for $7.50?

23. Charles picked ½ peck of berries, William ⅛ peck, and Alfred ¼ peck. How much did they all pick?

24. How much more is ⅘ of 80¢ than ⅘ of 75¢?

25. A boy bought 3½ pounds of butter for his mother. How many ounces did he buy?

26. If a man is 50 years old now, how old was he 22 years ago?

27. Mary works 4 hours and 40 minutes, and Nellie works 2 hours and 20 minutes. How many hours do they both work?

28. If you should receive 15 cents at one time, 26 cents at another time, and 14 cents at another time, how much would you receive in all?

29. If you had $\frac{3}{4}$ of a dollar, and should buy a pound of soda for 8¢ and a pound of tea for 45¢, how much would you have left?

30. If you give a boy $10, how many mills do you give him?

684. Boston Examination Questions. Slate.

1. In 6,987 days how many minutes?

2. Find the cost of 1,588,000 lb. of coal at $7.98 a ton.

3. How many cords of wood, at $7.85 a cord, can be purchased for $59,730.65?

4. Divide $3,245,530 by 468.

5. Bought 8 bu. 3 qt. valuable seed at seven dollars and eight cents a quart. How much did the seed cost?

6. What is the cost of 19 gal. 2 qt. of cologne at 90¢ a quart?

7. Divide $\frac{3}{4}$ of $60,800 equally among 75 persons.

8. Bought a house for $23,650, and land for $73,640. For how much must I sell them to gain $4,500?

9. Find the least common multiple of 21, 38, and 56.
The greatest common divisor of 45 and 135.

10. A grocer bought 7,200 gallons of oil, one-third of it leaked out, and he sold the remainder at 25 cents a gallon. How much did he receive for it?

11. From two and four-tenths yards take .445 of a yard.

12. Add the numbers from 490 to 505 (inclusive).

13. If 25 lb. of sugar cost $3.10, what will 19 lb. cost?

14. If 42 gal. 3 qt. 1 pt. of cream cost \$27.44, what will 32 pt. cost?

15. A man's bill at a provision store was \$6.66. He had bought two pecks of peas for \$0.54 and some beans for \$0.36. The rest of the bill was for sirloin steak at \$0.32 per pound. How many pounds of meat had he bought?

16. I have an oblong piece of land which is 96 ft. long and 72 ft. wide. There are three gateways; one is two feet wide, one is three feet wide, and the other is four feet wide. How many feet of fence will it take to go around the field?

17. Make out a bill for the following items, which were bought of R. H. White & Co.: 5 yards of broadcloth @ \$3.25, 4 yards of cambric @ \$0.12½, 4 yards of wadding @ \$0.08, 3 doz. buttons @ \$0.15, 6 skeins of sewing silk @ \$0.06.

18. Dictate for adding: (*a*) \$83.34; \$67.58; \$50.37; \$62.50; \$35.75; \$62.50; \$35.75; \$63.81; \$67.59; \$86.37; \$37.50; \$15.09; \$57.32; \$49.63.

(*b*) 909,087.5; 7,004.3; 1,000,500.004; 627,090; 5,040.29.

Dictate to be subtracted:

1,890,070 — 990,979.

19. A boy bought a suit of clothes for \$51, boots for \$10.50, overcoat for \$15.75, and gloves for 25¢. Paid for these things in work at \$1.25 per day. How many days did he work?

20. If \$36.53 will buy 6½ yd. of cloth, how much will ½ yd. cost?

21. If two quarts of peaches cost 25¢, what will half a bushel cost?

22. How many geographies at \$1.375 apiece can be bought for \$66?

23. Find the least common multiple of 6, 24, 32, 48, 96.

24. Spent $290.00 for horses, $286.75 for carriages, $150.80 for harness, and $12.75 for blankets. Gave 4 fifty-dollar bills and 2 one-hundred-dollar bills. What did I still owe?

25. How many bushels of oats will a span of horses eat in 4 weeks, if they eat 24 qt. a day?

26. How many bottles, each holding $\frac{1}{2}$ pt., will it take to hold 725 gal. and 2 qt. of vinegar?

27. How many pounds of rice at 12¢ a lb., will pay for 4 bu. 2 pk. of nuts at 8¢ a pt.?

28. A man had $600. He bought a horse for $225, a carriage for $190.12, and a harness for $40.76. He then gave away $\frac{1}{2}$ of what he had left. What did he still have?

29. Find the greatest common divisor of 18, 24, 36.

30. The least common multiple of 12, 20, and 30.

CHAPTER VIII.

DECIMALS. — BILLS. — DENOMINATE NUMBERS. — MEASUREMENTS. — PERCENTAGE. — INTEREST.

DECIMALS.

685. Changing Common Fractions to Decimals. Slate Exercises.

Reduce the following common fractions to decimals; *i.e.* perform the indicated division:

1. $1 \div 800$	8. $\frac{1}{32}$	15. $\frac{11}{250}$
2. $1 \div 40$	9. $\frac{21}{4000}$	16. $\frac{1}{625}$
3. $\frac{2}{25}$	10. $\frac{7}{2000}$	17. $\frac{375}{64}$
4. $\frac{25}{32}$	11. $\frac{18}{75}$	18. $\frac{18}{128}$
5. $\frac{17}{64}$	12. $\frac{7}{125}$	19. $\frac{1}{256}$
6. $\frac{8}{16}$	13. $\frac{23}{8}$	20. $\frac{7}{512}$
7. $\frac{3}{500}$	14. $\frac{47}{16}$	21. $\frac{1}{1024}$

686. Changing Decimals to Common Fractions.

What is the denominator of a decimal fraction?

What prime numbers are contained in 10? What are the only factors of 10? The prime factors of 100? Of 1,000?

Can $\frac{7}{1000}$ be reduced to lower terms? Why? Can $\frac{8}{100}$ be reduced to lower terms? Why? Can $\frac{485}{10000}$ be reduced to lower terms? How can we tell by merely looking at a decimal whether or not it can be reduced to a common fraction of lower terms?

687. Slate Exercises.

Reduce the following to common fractions — lowest terms. Do not find the greatest common divisor.

22. .0075	**32.** .27
23. .36	**33.** .027
24. .0275	**34.** .00365
25. .44	**35.** .96
26. .03125	**36.** .0009
27. .486	**37.** .816
28. .3750	**38.** .15625
29. .37500	**39.** .0375
30. .144	**40.** .00625
31. .0006	**41.** .096

ADDITION OF DECIMALS.

688. Add the following, reducing the common fractions to decimals:

42. $18\frac{3}{4} + 9.084 + 25\frac{1}{20} + 163 + 2.09 + 86\frac{1}{16} + .0975$

43. $275\frac{9}{100} + 58.64 + 8.6796 + 30\frac{1}{8} + 8\frac{2}{5} + 99 + 687\frac{23}{50}$

44. $84\frac{7}{10} + 93\frac{3}{100} + 3\frac{141}{1000} + \frac{219}{10000} + 684.1 + \frac{3}{4} + 17\frac{1}{2}$

45. $250 + 1875.93 + 16\frac{3}{5} + 8\frac{1}{40} + \frac{2}{25} + 608.94 + .0005$

46. $8.6796 + 96.8 + 18\frac{3}{8} + 250\frac{1}{80} + 34\frac{1}{20} + 1876$

47. $40\frac{8}{25} + 7.2832 + 86.3 + 128.46 + 2\frac{1}{25} + 41.5 + 8\frac{4}{5}$

48. $540 + 1.32 + .576 + \frac{88}{10000} + 68\frac{5}{16} + 395\frac{1}{5} + \frac{3}{25} + 7.51$

49. $5.308 + .25 + 567.8 + 8.4825 + 49.795 + 8\frac{3}{40}$

50. $7.08 + 23.04 + 8\frac{7}{10} + .348 + 3\frac{1}{25} + \frac{1}{125} + 7.00019$

51. $8\frac{9999}{10000} + 8\frac{4}{5} + 507 + 28\frac{49}{100} + \frac{9}{20} + 6.8819 + 3.1416$

SUBTRACTION OF DECIMALS.

689. Give answers in decimals:

52. $275.3 - 87\frac{2}{50}$

53. $387\frac{3}{8} - 99.0127$

54. $1{,}000 - \frac{1}{1000}$

55. $62.365 - 48\frac{3}{4}$

56. $198\frac{2}{5} - 13.6431$

57. $24\frac{3}{16} - 9\frac{99}{1000}$

58. $2{,}345 - 345\frac{1}{8\,2}$

59. $168\frac{3}{40} - 54.8759$

60. $18.42 - .576\frac{1}{4}$

61. $1{,}847\frac{11}{16} - 344\frac{9}{100}$

MULTIPLICATION OF DECIMALS.

690. Give answers in decimals:

62. $24.75 \times 3\frac{1}{5}$

63. $98\frac{2}{5} \times .00046$

64. $148\frac{1}{40} \times 12.5$

65. $380\frac{1}{2} \times .012$

66. $\frac{8}{8\,2} \times 1.48$

67. $19.5 \times .000484$

68. $1.876 \times 3\frac{2}{5}$

69. 3.48×4.8665

70. $.43\frac{1}{4} \times 1\frac{1}{16}$

71. $192.38 \times .238$

DIVISION OF DECIMALS.

691. Give 3 places of decimals in quotient, exclusive of ciphers. Divide without writing products (Arts. 385, 616):

72. $7.345 \div .29$

73. $340{,}753 \div 4.18$

74. $4.054 \div 18.25$

75. $123.5 \div 384$

76. $471 \div 5.325$

77. $.3126 \div .0134$

78. $12.345 \div .0047$

79. $.8756 \div 4.322$

80. $8 \div 122$

81. $15.3678 \div .9125$

82. $48.45 \div .089$

83. $39562.478 \div 4279$

84. $346.25 \div 64.8$

85. $9.1342 \div 208.3$

86. $1784 \div 29.57$

87. $343.71 \div 1.127$

88. $83.087 \div 5.37$

89. $137.84 \div 7.91$

90. $38.9008 \div .523$

91. $.81074 \div .009157$

692. Solve by short division.

When ciphers are canceled in the divisor, what change must be made in the decimal point of the dividend?

92. $18.756 \div 300$
93. $48.36 \div 4{,}000$
94. $.4824 \div 12{,}000$
95. $11.011 \div 700$
96. $3.6504 \div 90$
97. $45.63 \div 1{,}500$
98. $130.13 \div 1{,}100$
99. $.8712 \div 60$
100. $3.075 \div 5{,}000$
101. $.07056 \div 140$
102. $48.64 \div 200$
103. $.00531 \div 90{,}000$
104. $96.51 \div 60$
105. $87.5 \div 500$
106. $183.275 \div 10{,}000$
107. $1.7632 \div 1{,}600$
108. $1.5639 \div 130$
109. $614.4 \div 120$
110. $.576 \div 800$
111. $.8008 \div 7{,}000$

693. Questions from United States Civil Service Examinations.

1. Express $\frac{11}{320}$ decimally.
2. Divide 6 by .005.
3. Divide 714,394,756 by 1,754.
4. What is the sum of

7,569,813,420
2,850,497,361
4,961,738,053
6,407,581,329
1,098,635,247
9,768,015,234
3,891,437,205
5,076,921,438
7,804,193,826
1,073,945,862
3,196,478,250
4,207,561,839
9,476,541,083
2,851,370,694

5. A merchant buys goods for $2,965, and loses 15-hundredths by damage. How much money does he lose?

6. Five-eighths of 48 is $\frac{5}{8}$ of how many times 9?

($\frac{5}{8}$ of $48 = \frac{5}{8}$ of $? \times 9 = \frac{5}{8} \times 9 \times ?$)

7. A man bought a cargo of wool and sold seven thousand forty-five ten-thousandths of it. What part of the cargo had he left?

MISCELLANEOUS.

694. Slate Exercises.

1. Find the cost of 24,400 bricks @ $6.25 per M.

Ans. $\$6.25 \times 24.400 = \$6.25 \times 24.4$.

(How do we divide by 1,000?)

2. 760 pounds of hay @ 95 cents per cwt. (100 lb.).

3. 48,600 laths @ $2.80 per M.

4. 39,250 stamped envelopes @ $21.30 per thousand.

5. 1,875 pounds of straw @ 68 cents per cwt.

6. 108,745 Philadelphia bricks @ $22.00 per M.

7. 14,860 oranges @ 75¢ per 100.

8. 2,376 eggs @ $13\frac{1}{4}$¢ per doz.

9. 4,500 cigars @ $35 per M.

10. 28 doz. wax candles @ $13.50 per gross (144).

695. Solve by cancellation where possible:

11. 38,648 lb. of wheat @ 90¢ per bu. (60 lb.).

12. 18,964 lb. of coal @ $5 per ton (2,000 lb.).

13. 48,576 lb. of oats @ 36¢ per bu. (32 lb.).

14. 69,104 lb. of rye @ $91\frac{1}{2}$¢ per bu. (56 lb.).

15. 74,816 lb. of corn @ $48\frac{1}{4}$¢ per bu. (56 lb.).

16. 360 meters of cloth @ \$1.10 per yd. (1 meter = 39.37 inches).

17. Cost in United States money of 386 hats @ 24 francs each (1 franc = 19.3¢).

18. 480 meters of cloth @ 1.10 marks per meter (1 mark = 23.8¢).

19. 58,996 lb. of flour @ \$5.25 per bbl. (196 lb.).

20. 8,640 pens @ 59 cents per gross (144).

696. Perform indicated operations.

Change divisor to whole number, making corresponding change in the dividend. Cancel.

$$\frac{34.2 \times \overset{7}{\odot\!\!875}}{\odot\!\!125} = 239.4 \qquad \frac{\overset{234}{93\odot\!\!6} \times \overset{.001}{.182}}{\underset{4}{72\odot\!\!8}} = .234$$

21. $\dfrac{.249 \times 3.92}{.098}$ **26.** $\dfrac{450 \times 23.8}{1.19}$

22. $\dfrac{.083 \times .72}{288}$ **27.** $\dfrac{34.3 \times 8.1}{.49 \times 100}$

23. $\dfrac{.6876 \times .27}{.081}$ **28.** $\dfrac{.576 \times 6.3}{14.4 \times 25}$

24. $\dfrac{7.72 \times 65}{19.3}$ **29.** $\dfrac{2.75 \times .801}{1.1 \times 6}$

25. $\dfrac{3.1416 \times 2.3}{.7854}$ **30.** $\dfrac{.306 \times 8.75}{.9 \times 68}$

697. Reduce to common fractions — lowest terms:

31. $.3\frac{1}{3}$ **35.** $.006\frac{1}{4}$ **39.** $.009\frac{1}{11}$

32. $.33\frac{1}{3}$ **36.** $.01\frac{1}{9}$ **40.** $.04\frac{1}{6}$

33. $.16\frac{2}{3}$ **37.** $.06\frac{2}{3}$ **41.** $.76\frac{2}{13}$

34. $.142\frac{6}{7}$ **38.** $.833\frac{1}{3}$ **42.** $.037\frac{1}{2}$

698. United States Civil Service. Postal Service. Clerks.

1. Express in words the following: 990,050,006.0021.

2. Express in figures the following, avoiding the use of common (or vulgar) fractions:

One million three thousand seven hundred one and one ten-thousandth.

3. Express in words the following signs and figures: 20 lb. 8 oz. @ 2¢ per oz. = $6.56.

4. If a railroad car runs 41½ miles per hour, how far would it go in 12 days, running 10½ hours per day?

5. If paper is worth 40 cents per pound, what is the cost of one sheet of paper weighing six pounds to the ream? (480 sheets = 1 ream.)

6. The following table shows, in part, the amounts appropriated for, and the amounts expended in, the office of the First Assistant Postmaster-General for the year ended June 30, 1886. Required: (1) the total amount expended, (2) the total amount appropriated, and (3) the unexpended balance.

Items.	Amounts expended.	Amounts appropriated.
Postmasters' salaries	$11,348,178.17	$12,300,000.00
Clerks' salaries	4,977,663.47	5,150,000.00
Carriers' salaries, etc.	4,312,296.70	4,485,000.00
Wrapping paper	28,766.49	35,000.00
Totals	$	$
Total expenses brought down		
Unexpended balance		$

7. Three gross of lead pencils are divided equally among the clerks in a post-office, giving to each clerk eleven and leaving a remainder of fourteen pencils. How many clerks are there in the office?

8. Find the value of each of the following items and total value of the whole:

28,155 one-cent stamps . . . . . $
3,200 two-cent " . . . . . .
12,200 five-cent " . . . . . .
25,500 one-cent stamped envelopes @ $11.30 per M. . .
31,500 two-cent stamped envelopes @ $21.30 per M. . .

Total . . . . . $

9. An office uses 98 pounds of twine per year in tying packages. Allowing 178 yards to the pound, how many packages are tied, if each requires an average of $1\frac{1}{2}$ feet?

10. Multiply 693.6 by 785.09 and divide the product by 25.

699. Blackboard Exercises.

Write answers at sight:

1. $24\frac{1}{2} + 15\frac{3}{4}$
2. $13\frac{2}{3} \times 6$
3. $42\frac{1}{8} - 13\frac{1}{8}$
4. $31\frac{1}{2} \div 4\frac{1}{2}$
5. $50\frac{2}{3} + 20\frac{1}{3}$
6. $80\frac{1}{6} - 40\frac{1}{4}$
7. $5\frac{1}{2} \times 5\frac{1}{2}$
8. $24\frac{2}{5} \div 2$
9. $36\frac{1}{3} \div 3$
10. $17\frac{1}{4} \div 4$
11. $21\frac{1}{4} \div 5$
12. $48\frac{6}{7} \div 6$
13. $18\frac{2}{8} \div 7$
14. $24\frac{1}{2} \div 8$
15. $36\frac{3}{5} \div 9$
16. $54\frac{1}{2} - 39\frac{3}{4}$
17. $48\frac{8}{9} \div 4$
18. $62\frac{1}{8} + 23\frac{1}{8}$
19. $12\frac{3}{4} \times 6$
20. $66\frac{2}{3} + 33\frac{1}{3}$
21. $33\frac{1}{3} - 16\frac{2}{3}$
22. $1\frac{3}{4} \times 1\frac{3}{4}$
23. $80 \div \frac{5}{6}$
24. $72 \div \frac{3}{4}$
25. $56 \div \frac{7}{8}$
26. $80 \div \frac{4}{5}$
27. $75 \div 1\frac{1}{2}$
28. $90 \div 1\frac{2}{3}$
29. $98 \div 1\frac{3}{4}$
30. $81 \div 1\frac{4}{5}$

MEASUREMENTS.

700. How many *square inches* in each of the following rectangles? First change each dimension to inches.

1. 42 in. by 36 in.
2. 71 in. by 18 in.
3. 3 ft. 1 in. by 4 ft. 2 in.
4. 5 ft. 3 in. by 6 ft. 4 in.
5. 12 ft. by 18 ft.
6. 9 ft. by 11 ft.
7. 27 in. by 30 in.
8. 65 in. by 92 in.
9. 7 ft. 3 in. by 2 yd.
10. 3 yd. by 6 ft. 6 in.

701. How many *square feet* in each of the following rectangles? First change each dimension to feet, or to feet and a fraction.

11. 18 ft. by 24 ft.
12. 36 in. by 4 ft.
13. 6 yd. by 8 yd.
14. 1 yd. by 48 in.
15. $3\frac{1}{2}$ ft. by 4 ft.
16. 3 ft. by $1\frac{1}{3}$ yd.
17. 42 in. by 4 ft.
18. 25 ft. by 17 ft. 6 in.
19. 42 in. by 48 in.
20. 13 yd. by 15 yd.

702. How many *square yards* in each of the following rectangles? Change each dimension to yards, or to yards and a fraction.

21. 18 yd. by 25 yd.
22. 15 yd. by 1 yd. 1 ft.
23. 27 ft. by 36 ft.
24. 54 ft. by 2 ft. 6 in.
25. 24 yd. by 27 in.
26. 36 yd. by 24 in.
27. 17 ft. 6 in. by 32 in.
28. 22 ft. 9 in. by 18 in.
29. 108 in. by 90 in.
30. 180 ft. by 54 in.

SPECIAL DRILLS.

703. Give sums:

$135+89$	$450+690$	$576+76$	$274+815$
$56+256$	$680+350$	$85+646$	$783+306$
$394+77$	$870+260$	$768+48$	$459+740$
$39+461$	$940+480$	$56+575$	$624+535$

704. Give differences:

$224-135$	$1{,}089-274$	$1{,}200-610$	$458-69$
$331-286$	$1{,}197-736$	$1{,}460-780$	$375-87$
$442-369$	$1{,}258-630$	$1{,}320-390$	$672-95$
$554-437$	$1{,}476-823$	$1{,}210-240$	$818-29$

705. Give products:

82×25	98×4	$46\times33\frac{1}{3}$	63×12
25×73	89×5	$39\times33\frac{1}{3}$	54×11
64×25	78×6	$26\times33\frac{1}{3}$	75×9
25×55	67×7	$19\times33\frac{1}{3}$	86×8

706. Give quotients:

$792\div9$	$792\div88$	$975\div25$	$300\div33\frac{1}{3}$
$415\div5$	$380\div76$	$850\div25$	$433\frac{1}{3}\div33\frac{1}{3}$
$693\div11$	$693\div63$	$675\div25$	$666\frac{2}{3}\div33\frac{1}{3}$
$406\div7$	$486\div54$	$825\div25$	$533\frac{1}{3}\div33\frac{1}{3}$

707. Give answers:

$12\frac{3}{4}\times5$	$3\times8\frac{5}{6}$	$4\frac{9}{10}\times7$	$11\times2\frac{1}{10}$
$11\frac{2}{3}\times4$	$4\times7\frac{6}{7}$	$3\frac{8}{11}\times8$	$12\times3\frac{2}{9}$
$10\frac{1}{2}\times3$	$5\times6\frac{7}{8}$	$2\frac{5}{12}\times9$	$11\times4\frac{3}{8}$
$9\frac{4}{5}\times2$	$6\times5\frac{8}{9}$	$1\frac{2}{11}\times10$	$10\times5\frac{4}{7}$

708. Oral Problems.

1. I sold 375 bushels of wheat to one miller and 87 to another. How many bushels did I sell?

2. Bought goods to the amount of $4.29. How much change from a $5 bill?

3. What will be the cost of 89 tons of coal at $5 per ton?

4. If 49 hats cost $147, what is the cost of one hat?

5. 567 marbles are divided among 9 boys. How many does each receive?

6. How many yards in 5 pieces of cloth, each containing $12\frac{3}{4}$ yd.?

7. Divide $29\frac{2}{3}$ by 7.

8. What will be the cost of a barrel of flour at $5.25 and 8 lb. of sugar at 6¢?

9. When silk is 75¢ per yd., how many yards can be bought for $9.75?

10. If $2\frac{5}{8}$ yd. ribbon cost 42 cents, what will $3\frac{3}{4}$ yd. cost?

11. How much must be paid for 55 lb. of raisins, at 8¢ per lb.?

12. Find the cost of 320 lb. of hay at 60¢ per hundred pounds.

13. If eggs are sold at the rate of 18 for 25 cents, what will be the cost of 6 dozen eggs?

14. Three men require 22 days to do a certain piece of work. How long would it take 11 men to do the same work?

15. A father earned $14.60, his son earned $7.80. What were the earnings of both?

16. How many yards of fence will be required to enclose a rectangular field 98 yards long and 50 yards wide?

17. A farmer divides his farm of 425 acres into fields of $12\frac{1}{2}$ acres each. How many fields has he?

18. There are 36 inches in a yard. How many yards are there in 324 inches?

19. The product is 925, the multiplier is 25. What is the multiplicand?

20. What will be the cost of 46 tons of hay, at $\$12\frac{1}{2}$ per ton?

21. What is the weight of 25 firkins of butter, each containing 56 pounds?

22. At $\$1.75$ per yard, how many yards of cloth can be bought for $\$49$?

23. What price was paid for 20 sheep, at $\$8.75$ per head?

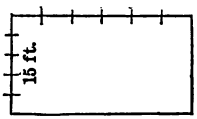
24. A man saved $\$320$ per year for 5 years. How much more would he require to make $\$2{,}000$?

25. Mr. Jones sold a lot for $\$675$, thereby losing $\$85$. What did he pay for it?

709. Slate Problems.

1. The width of a room is $\frac{5}{8}$ of its length. How many square feet in the floor, if the width is 15 ft.?

2. If 2 lb. 6 oz. of tea cost 95 cents, how many pounds and ounces can be bought for $\$2.35$?



3. What will be the duty on 175 kilograms of wool at 33 ct. per lb.? (1 kilogram = 2.2046 lb.)

4. John and James went out together. John had 38 cents. When one of the boys had spent 18 cents and the other had spent 16 cents, they had 24 cents left between them. Find the amount of money James had.

5. Find $\frac{1}{2}$ of the sum of $\frac{2}{5}$ and $\frac{3}{4}$.

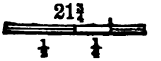
6. What is $\frac{2}{5}$ of the difference between $\frac{4}{5}$ and $\frac{5}{6}$?

7. What fraction added to $\frac{2}{7}$ gives $\frac{3}{4}$?

8. Change $1\frac{3}{11}$ hour to seconds.

9. $\frac{5}{8}$ of what number equals 180?

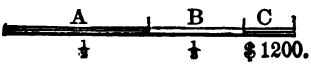
10. The half of a number added to its fourth part equals $21\frac{3}{4}$. What is the number?



11. A farm is sold for \$5,700, at a loss of $\frac{1}{20}$ of the cost. What was the cost?

12. When it is noon at Philadelphia, it is 15 seconds and 10 minutes past 5 P.M. at Paris. What time is it at Philadelphia when it is noon at Paris?

13. A, B, and C buy a house. A furnished $\frac{1}{2}$ of the cost, B $\frac{1}{3}$, and C \$1,200. What did A and B pay, respectively?



14. A room is $22\frac{1}{2}$ ft. long and 18 ft. wide. What will it cost, at 5¢ per yard, for a strip of moulding around the walls?

15. How many square yards of carpet would be needed for the floor of the above room?

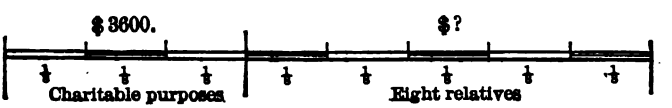
16. How much is the fraction $\frac{3}{4}$ increased or diminished when 2 is added to each of its terms (numerator and denominator)?

17. After James has spent $\frac{3}{4}$ of his money and $\frac{1}{2}$ of the remainder he has but \$1.50 left. How much had he at first?

18. A man buys oranges at \$1.20 per 100. How many would he have to sell, at 25¢ per dozen to gain \$3.18?

19. From a piece of cloth measuring $28\frac{1}{2}$ yards, there have been sold $2\frac{3}{8}$ yd., $6\frac{5}{8}$ yd., $13\frac{3}{4}$ yd. If the remainder is worth \$13.10, what is the value of the whole piece?

20. A man left for charitable purposes \$3,600, which was $\frac{3}{8}$ of his money. The remainder was divided equally among 8 relatives. How much did each relative receive?



REVIEW.

710. Supply missing numbers:

1.	2.	3.
$18,432.65	$26,459.83	$93,259.80
9,876.04	6,087.90	10,059.77
632.95	12,364.58	5,387.04
27.88	3,030.30	.25
5.63	999.99	23.50
.99	6,875.84	681.19
.04	365.93	32,565.88
.87	?	793.20
2.90	6.50	2,684.39
83.15	25.19	?
700.07	308.12	15,909.75
4,862.99	4,321.00	123.40
?	.87	6.15
$50,000.00	$76,543.21	$202,020.20

711. Complete the following table of public school attendance:

	Colored.			White.			Aggregate.
	Male.	Female.	Total.	Male.	Female.	Total.	
Auburn	40	35	75	1,706	1,753	3,459	3,534
Binghamton . .	21	20		2,325	2,397		
Brooklyn . . .	839	797		54,647	54,439		
Cohoes	—	—	—	1,362	1,257		
Elmira	40	61		2,317	2,211		
New York . . .	806	806		98,029	98,304		
Rochester . . .	31	38		8,258	8,597		
Rome	5	5		1,094	992		
Saratoga Springs.	35	34		1,088	1,116		
Yonkers . . .	15	15		1,878	1,716		
	1,832						

712. Questions from United States Civil Service Examinations.

1. How many bushels of oats at $\frac{4}{5}$ of a dollar a bushel will pay for $\frac{4}{5}$ of a barrel of flour at $4.75 a barrel?

2. At 70 cents per 100 pounds, what will be the amount of duty on an invoice of 3,622 railway bars, each bar being 27 feet long and weighing 60 pounds to the yard?

3. A grocer having a capital of $10,000, invested $\frac{1}{5}$ of it in tea at $\frac{9}{16}$ of a dollar per pound, $\frac{5}{20}$ of the remainder in coffee at $\frac{1}{8}$ of a dollar per pound, and $\frac{3}{25}$ of the rest in sugar at $5\frac{3}{16}$ cents per pound. What quantity of each did he buy, and what money had he left?

4. In a mass of alloy weighing 291.42685 pounds, there were found 40.0921 pounds of silver, 160.09090 pounds of copper, 22.002 pounds of iron, and .426900 pounds of zinc. The remainder was lead. What was the weight of the lead?

5. A merchant bought 30 pieces of cloth, each containing 41.5 yards, for $3.875 per yard, and 25 pieces of 36.8 yards each, for $4.125 per yard. He sold the entire lot for $3.96 per yard. How much did he gain or lose?

6. An importer received a box of chemicals weighing 122.49 French grams, each gram containing 15.432 English grains, on which he paid a duty of $.05 per grain. What was the amount of duty?

7. A man had property valued at $6,500. What will be his taxes at the rate of $10.80 per $1,000?

8. A dealer exported 374.3190 bushels of corn, receiving in exchange coal at the rate of 1 ton of coal for 15.124 bushels of corn. How much coal did he receive?

9. Find the sum of two and twenty-five thousandths, five and twenty-seven ten-thousandths, forty-seven and one hundred twenty-six millionths, one hundred fifty and seven ten-millionths.

SHORT METHODS.

713. Sight Exercises.

1. 68×25	6. 72×25	11. 96×25	16. 88×25
2. 25×49	7. 25×51	12. 25×81	17. 25×97
3. $88 \times 12\frac{1}{2}$	8. $66 \times 33\frac{1}{3}$	13. $48 \times 37\frac{1}{2}$	18. $16 \times 87\frac{1}{2}$
4. 24×75	9. 48×75	14. 92×50	19. $66 \times 66\frac{2}{3}$
5. $82 \times 12\frac{1}{2}$	10. $24 \times 62\frac{1}{2}$	15. $32 \times 33\frac{1}{3}$	20. $16 \times 66\frac{2}{3}$

714. Slate Exercises.

1. $9{,}347 \times 25$	11. $4{,}896 \times 87\frac{1}{2}$
2. 863×75	12. $1{,}284 \times 62\frac{1}{2}$
3. $8{,}123 \times 12\frac{1}{2}$	13. $75 \times 2{,}468$
4. $6{,}483 \times 33\frac{1}{3}$	14. $33\frac{1}{3} \times 3{,}870$
5. $8{,}123 \times 125$	15. $66\frac{2}{3} \times 3{,}456$
6. $9{,}347 \times 250$	16. $16\frac{2}{3} \times 1{,}266$
7. $9{,}347 \times 2\frac{1}{2}$	17. $8{,}408 \times 62\frac{1}{2}$
8. $9{,}347 \times 75$	18. $3{,}875 \times 37\frac{1}{2}$
9. $6{,}483 \times 66\frac{2}{3}$	19. $1{,}925 \times 12\frac{1}{2}$
10. $6{,}488 \times 37\frac{1}{2}$	20. $7{,}314 \times 250$

715. Oral Problems.

1. What will be the cost of 49 lb. of coffee at 25 ¢ per lb.?

2. I paid \$14.75 for eggs at 25 ¢ per doz. How many dozen did I buy?

3. What will be paid for 104 bu. of wheat at $87\frac{1}{2}$ ¢ per bushel?

4. How many bushels of corn at $62\frac{1}{2}$ ¢ per bu. can be bought for \$150?

5. How much will be paid for 99 yd. of dress goods at $33\frac{1}{3}¢$ per yd.?

6. How many yards of carpet at $66\frac{2}{3}¢$ per yard can be bought for $84?

7. Find the cost of 15 doz. collars at $12\frac{1}{2}¢$ each?

8. Paid $24 for cuffs at $16\frac{2}{3}¢$ per pair. How many dozen pairs were bought?

9. What will be the cost of 128 lb. of tea at 75¢ per lb.?

10. A bale of cotton at $6\frac{1}{2}¢$ per lb. cost $25. What was the weight of the cotton?

11. A farmer sold hay at 75¢ per cwt., receiving for it $39. How many cwt. did he sell?

12. How many bbl. of mess pork at $12.50 per bbl. can be bought for $175?

13. What will be the cost of 96 yd. of carpet at $1.25 per yd.?

14. When wheat sells at $1.12\frac{1}{2}$ per bu., how many bushels can be bought for $198?

15. At $3.50 each, what will be paid for 84 coats?

16. Find the cost of 28 hats at $2.75 each?

17. A real estate agent sold 97 lots at $250 each. How much did he receive for them?

18. What will be the cost of 248 horses at $125 each?

19. At $\frac{1}{2}$ cent each, how many pen-holders can I buy for $5.76?

20. Paid $3,675 for cows at $75 each. How many were bought?

716. Slate Exercises.

Multiply 1875 by 21.

3750

39,375 *Ans.*

Do not place the multiplier underneath the multiplicand.

1. $3,456 \times 31$
2. $7,465 \times 81$
3. $2,345 \times 41$
4. $5,432 \times 91$
5. $9,284 \times 51$
6. $1,897 \times 101$
7. $6,736 \times 61$
8. $11,689 \times 111$
9. $4,892 \times 71$
10. $10,754 \times 121$

717. 2468×18.

19744

44,424 *Ans.*

Write the product by 8 one place to the right (above or below).

11. $8,734 \times 13$
12. $4,075 \times 18$
13. $9,485 \times 14$
14. $5,832 \times 19$
15. $6,739 \times 15$
16. $7,890 \times 108$
17. $4,567 \times 16$
18. $3,045 \times 107$
19. $9,876 \times 17$
20. $2,876 \times 106$
21. $576 \times 14 \times 21$
22. $345 \times 15 \times 41$
23. $487 \times 18 \times 81$
24. $207 \times 16 \times 91$
25. $372 \times 25 \times 51$
26. $723 \times 33\frac{1}{3} \times 16$
27. $644 \times 31 \times 75$
28. $486 \times 66\frac{2}{3} \times 71$
29. $576 \times 37\frac{1}{2} \times 15$
30. $832 \times 87\frac{1}{2} \times 41$

718. U. S. Civil Service. Special Examinations for Type Writers.

1. The internal revenue tax collected on certain items in 1881 was as follows: Cigars, $16,095,724.78; cigarettes, $992,-981.22; snuff, $689,183.03; smoking and chewing tobacco, $22,833,287.60; ale, beer, and porter, $13,237,703.63; bank capital, $811,006.35. What was the whole amount of tax collected on these items?

2. The total ordinary receipts of the Government for the fiscal year 1882 were $403,525,250.28; and the total ordinary expenditures for the same period were $257,981,439.57. What was the excess of receipts over expenditures?

3. Write in figures: one hundred thousand three hundred two dollars and four cents.

4. Express in words: 103,004,375.05.

5. Seven hundred two dollars and ninety cents are to be divided among nine men and three boys; the boys are to have twenty-five dollars and five cents each, and the balance is to be divided equally among the men. What is each man's share?

6. If 25 women copy 75 record-books of 660 pages each in 165 days, how many pages per day will each one copy?

7. In an orchard there are 907 apple trees, each yielding 19 bushels of apples. How many bushels did the whole orchard yield, and what would the yield be worth at 79 cents per bu.?

8. From $\frac{2}{3}$ of $\frac{3}{5}$ of $\frac{5}{6}$ of $3\frac{1}{3}$ subtract $\frac{1}{2}$ of $\frac{2}{3}$, and reduce to lowest terms.

APPROXIMATIONS.

719. Give approximate answers, at sight (Art. 521):

1. $23\frac{7}{8}$ lb. of tea @ $50\frac{1}{8}¢$.
2. 24 horses @ $124.95.
3. 64 yd. of carpet @ $87\frac{7}{16}¢$.
4. 485 bu. of wheat @ $99\frac{3}{4}¢$.
5. 96 lb. of coffee @ $24\frac{7}{8}¢$.
6. 840 yd. of dress goods @ $33\frac{5}{16}¢$.
7. 360 yd. of oil cloth @ $66\frac{3}{4}¢$.
8. 48 cwt. of straw @ $62\frac{5}{8}¢$.
9. 92 hats @ $1.49\frac{3}{4}$.
10. 128 lb. of lard @ $12\frac{3}{8}¢$.

720. Give approximate answers in whole numbers:

11.	$27 ÷ 24$\frac{5}{16}$¢	21.	17.3 × 3.98765
12.	$299.96 ÷ 1.49\frac{7}{8}$	22.	256.008 × .249875
13.	$24.05 ÷ 37$\frac{9}{16}$¢	23.	25.1234 × 15.93
14.	$15.03 ÷ 12$\frac{5}{8}$¢	24.	6.12 × 6.12
15.	$60 ÷ 2.49\frac{15}{16}$	25.	86.4 × .996
16.	$32 ÷ 33$\frac{3}{8}$¢	26.	33.333 × 5.004
17.	$69.95 ÷ 87$\frac{1}{2}$¢	27.	799.387 × .125
18.	$60 ÷ 62$\frac{7}{16}$¢	28.	7.999 × 7.99
19.	$64 ÷ 66$\frac{11}{16}$¢	29.	7.33 × 11.0083
20.	$27.95 ÷ $1.75	30.	64.002 × .3750

721. Sight Exercises.

Give products:

1.	360 × .25	8.	840 × .075	15.	400 × .04
2.	560 × .125	9.	960 × .005	16.	165 × .06$\frac{2}{3}$
3.	240 × .375	10.	1,200 × .001	17.	176 × .06$\frac{1}{4}$
4.	400 × .625	11.	1,500 × .002	18.	3,300 × .00$\frac{1}{3}$
5.	480 × .75	12.	96 × .3$\frac{1}{3}$	19.	880 × .12$\frac{1}{2}$
6.	320 × .875	13.	840 × .02$\frac{1}{2}$	20.	105 × .8
7.	720 × .025	14.	1,500 × .06	21.	210 × .10

722. Give quotients:

1.	240 ÷ .5	8.	37 ÷ .05	15.	76 ÷ .04
2.	360 ÷ .75	9.	48 ÷ .005	16.	88 ÷ .00$\frac{1}{3}$
3.	45 ÷ .125	10.	72 ÷ .025	17.	65 ÷ .12$\frac{1}{2}$
4.	23 ÷ .25	11.	92 ÷ .002	18.	84 ÷ .8
5.	360 ÷ .375	12.	93 ÷ .03$\frac{1}{3}$	19.	11 ÷ .06$\frac{1}{4}$
6.	100 ÷ .625	13.	54 ÷ .02$\frac{1}{2}$	20.	42 ÷ .6$\frac{2}{3}$
7.	154 ÷ .875	14.	132 ÷ .06	21.	93 ÷ .5

723. Give results:

1. $\frac{87 \times 25}{75}$
2. $\frac{74 \times 24}{37}$
3. $\frac{63 \times 19}{21}$
4. $\frac{96 \times 27}{32}$
5. $\frac{23}{8} \times 32$
6. $\frac{47}{15} \times 75$
7. $\frac{65}{14} \times 42$
8. $\frac{39}{11} \times 55$
9. $64 \times 1\frac{5}{8}$
10. $72 \times 1\frac{1}{3}$
11. $38 \times 1\frac{1}{2}$
12. $95 \times 1\frac{1}{5}$
13. $18 \times 2\frac{5}{9}$
14. $16 \times 3\frac{1}{2}$
15. $14 \times 5\frac{1}{7}$
16. $12 \times 9\frac{3}{4}$
17. $22 \div 2\frac{3}{4}$
18. $33 \div 1\frac{3}{8}$
19. $60 \div 2\frac{1}{7}$
20. $40 \div 6\frac{2}{3}$

DENOMINATE NUMBERS.

724. Oral Problems.

1. What will be the weight of 16 hams that average 10 lb. 5 oz. each?

2. From a chest of tea containing 54 lb. there were sold 27 lb. 7 oz. How many lb. remain?

3. Seven bushels of potatoes are divided among 8 persons. How many pecks and quarts does each receive?

4. How many square inches in the surface of a sheet of paper measuring 11 inches by 13 inches?

5. How many feet and inches in $\frac{4}{9}$ yd.?

6. What decimal of a pound is 14 oz.?

7. A man buys a bushel of hickory nuts. After he sells 2 pk. 4 qt., what fraction of the bushel has he left?

8. A dealer puts 30 gal. of milk in cans holding 1 qt. 1 pt. each. How many cans does he fill?

9. At $20 per month, how much rent will a man pay in 1 year and 5 months?

10. 75 hundredths of a pound is how many ounces?

11. How many feet in 5 rods?

12. 1 gal. 3 qt. 1 pt. of milk is divided among 5 people. How many quarts and pints does each receive?

13. What fraction of 2 lb. 3 oz. is 1 lb. 4 oz.?

14. Three-eighths of a ton is how many pounds?

15. Change 9 hours 36 minutes to the fraction of a day.

725. Slate Problems.

1. 32 hams weigh 458 pounds. What is the average weight?

$$
\begin{array}{r}
\text{14 lb. 5 oz.} \\
32\overline{)458 \text{ lb.}} \\
\underline{138} \\
\text{10 lb. remainder.} \\
\underline{16} \\
\underline{160} \text{ oz., new dividend.} \\
0
\end{array}
$$

Ans. 14 lb. 5 oz., average.

2. 595 gal. of oil are put into 14 barrels. How many gal. and qt. does each contain?

3. If there are 42 gal. and 2 qt. in a barrel of oil, how much oil will there be in 15 barrels?

4. In the written number 54,372, the value expressed by the 5 is how many times the value expressed by the 2?

5. A piece of cloth containing 57 yd. is divided equally among six persons. What is the length of each one's share?

6. How many minutes in 1 day, 1 hour, and 1 minute?

7. July 1 is the last school day. How many days' vacation will there be, if school begins Sept. 6?

8. How many hours and minutes are there from half-past 3 Saturday afternoon to a quarter before 9 Monday morning?

9. How many steps, 2 ft. 6 in. long, must a man take in walking 1,200 yards?

10. A man owns a plot of ground 420 ft. long, 240 ft. wide. How many rods of fence will be required to enclose it?

11. A train goes from Jersey City to Washington, 228 miles, in 4 hours 12 minutes. How many miles an hour does it travel? How long does it take the train to go one mile?

12. On Monday a boarding-house uses 3 gal. 2 qt. of milk; on Tuesday, 4 gal.; on Wednesday, 3 gal. 3 qt. 1 pt.; on Thursday, 4 gal. 2 qt.; on Friday, 6 gal.; on Saturday, 5 gal. 2 qt. 1 pt.; on Sunday, 3 gal. 1 pt. How much is used during the week, and what is the average per day?

13. June 21 the sun rises at New York at 4.23 A.M. and sets at 7.40 P.M. How long is the night?

14. From $3\frac{7}{8}$ bu. take $3\frac{7}{8}$ pk.

15. What is the length in rods of a fence surrounding a field 206 ft. 3 in. wide and twice as long?

REVIEW FRACTIONS.

726. Slate Exercises.

Add:

1. $29\frac{3}{5} + 17 + 62\frac{7}{10}$
2. $1\frac{3}{4} + 3\frac{5}{8} + 13\frac{7}{12} + 6\frac{1}{8}$
3. $43\frac{2}{3} + 30 + 63\frac{3}{4} + 8\frac{1}{16} + \frac{7}{8}$
4. $11\frac{4}{15} + 25\frac{8}{10} + 42\frac{5}{6} + 8\frac{2}{3} + 9\frac{1}{4}$
5. $83\frac{5}{32} + 9\frac{11}{16} + 70\frac{13}{30} + 6\frac{7}{24} + 37$
6. $2\frac{1}{5} + 80\frac{1}{8} + \frac{7}{8} + 62\frac{1}{2} + 93\frac{11}{12}$
7. $1\frac{1}{2} + 21\frac{1}{3} + 32\frac{1}{4} + 43\frac{1}{5} + 54\frac{1}{6}$
8. $92\frac{7}{10} + 68\frac{5}{12} + 3\frac{3}{4} + 7\frac{2}{5} + 39$
9. $755\frac{19}{36} + 25\frac{1}{4} + 30\frac{3}{8} + 5\frac{2}{3} + 13\frac{1}{12}$
10. $60\frac{4}{25} + 49\frac{8}{50} + 18\frac{7}{20} + 6\frac{3}{4} + 90\frac{1}{2}$

727. Subtract:

11. $43\frac{1}{2} - 25\frac{3}{5}$
12. $94\frac{2}{5} - 18\frac{4}{7}$
13. $69\frac{7}{10} - 33\frac{13}{25}$
14. $57\frac{1}{16} - 26\frac{17}{60}$
15. $100\frac{3}{24} - 50\frac{11}{36}$
16. $126\frac{6}{35} - 88\frac{2}{7}$
17. $99\frac{3}{16} - 61\frac{7}{20}$
18. $84\frac{7}{36} - 15\frac{7}{27}$
19. $23\frac{1}{20} - 6\frac{1}{12}$
20. $912\frac{19}{30} - 684\frac{23}{45}$

728. Multiply:

21. $43\frac{1}{2} \times \frac{2}{5}$
22. $\frac{33}{45} \times 41\frac{1}{16}$
23. $16\frac{3}{4} \times 12\frac{4}{7}$
24. $4\frac{3}{10} \times 12\frac{2}{9}$
25. $2\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}$
26. $\frac{3}{4} \times 1\frac{2}{5} \times 3\frac{4}{21}$
27. $23\frac{1}{4} \times 10\frac{2}{3}$
28. $8\frac{5}{6} \times 9\frac{3}{5}$
29. $\frac{9}{10} \times 1\frac{1}{3} \times 3\frac{4}{7}$
30. $16\frac{2}{3} \times \frac{3}{50} \times 83\frac{1}{5}$

729. Divide:

31. $\frac{7}{10} \div \frac{3}{5}$
32. $\frac{9}{16} \div \frac{3}{20}$
33. $138\frac{7}{15} \div \frac{1}{10}$
34. $17\frac{19}{21} \div 1\frac{1}{12}$
35. $18\frac{3}{4} \div 2\frac{1}{3}$
36. $7\frac{3}{5} \div 3\frac{3}{10}$
37. $37\frac{3}{5} \div 15$
38. $128\frac{4}{17} \div 25$
39. $5 \div 9\frac{1}{6}$
40. $7 \div 12\frac{3}{5}$

730. Perform indicated operations:

41. $(1\frac{1}{3} \div \frac{2}{7}) + (6\frac{3}{5} \div \frac{1}{4})$
42. $\dfrac{(\frac{3}{4} \times 20) - (4\frac{1}{3} \times 2\frac{1}{2})}{\frac{1}{3} + \frac{2}{3}}$
43. $\dfrac{16}{\frac{2}{3} \text{ of } 4\frac{1}{2}} + \dfrac{5\frac{1}{2}}{\frac{1}{3} \text{ of } 1\frac{1}{7}}$
44. $23\frac{3}{4} \div (3\frac{1}{3} + 1\frac{2}{5})$
45. $52\frac{1}{2} \times (1\frac{7}{8} - \frac{15}{16})$
46. $\dfrac{4\frac{1}{2} + 3\frac{1}{3} - 6\frac{7}{8}}{5}$
47. $\dfrac{\frac{2}{3} \text{ of } \frac{3}{4}}{15} \div \dfrac{\frac{5}{8} \text{ of } 2\frac{2}{5}}{8}$
48. $\frac{2}{7}$ of $(3\frac{1}{3} - 2\frac{1}{6} + 9\frac{1}{3})$

731. Brooklyn Public Schools. Examination Questions.

1. Add 3.684; 19.5; .00875; 15,863.625; 8.7; and 100.4875.

2. Change to a common fraction in its lowest terms .009375. Change $\frac{3}{64}$ to a decimal.

3. Multiply seventy thousand fourteen hundred-thousandths by one hundred nine millionths, and divide the product by five hundred forty-five.

4. What will be the cost of 53,715 pounds of wheat at 97½ cents per bushel of 60 pounds?

5. What number multiplied by 43¾ will produce 265½?

6. What decimal of a bushel is 3 quarts?

7. If ¾ lb. of tea costs $\frac{1}{2}$, how many pounds can be bought for $7.50?

8. A man sells $\frac{5}{8}$ of an acre of land for $93.75. What would be the value of his farm of 150¼ acres at the same rate?

9. At 24 cents per gallon, what will be the cost of 16 gal. 3 qt. 1 pt. of milk?

10. A coal dealer buys 375 tons coal at $4.25 per ton of 2,240 lb. He sells it at $4.50 per ton of 2,000 lb. What is his profit?

11. A drover sold 15 oxen, weighing 1,468 pounds each, at $4.40 per hundred pounds. How much did he receive?

12. At 24 cents for 7 pounds of flour, how much would a grocer receive for 3 barrels of flour weighing 196 pounds each?

13. After losing $\frac{1}{3}$ of his money, a man had $4,075 left. How much had he at first?

14. Reduce .005025 to a common fraction.

15. .75 is what part of 3.25?

16. The circumference of a circle is 3.1416 times the diameter. What is the diameter of a circular track 1,760 yards in circumference? Find to two places of decimals.

17. What will be the cost of 24 gal. 3 qt. 1 pt. of milk at 4 cents per pint?

18. A man bought a house for $6,250 and sold it for $6,500. What fraction of the cost is the profit? What decimal?

19. At $30 per month, how much rent would a man pay from July 1, 1894, to May 16, 1896?

20. Bought 60 yards of cloth at the rate of 2 yards for $5, and 80 yards more at the rate of 4 yards for $9. I immediately sold the whole of it at the rate of 5 yards for $12. How much did I gain?

21. A man purchased 40 bushels of apples at $1.50 per bushel. Twenty-five hundredths of them were damaged, and he sold them at 20 cents per peck. He sold the remainder at 50 cents per peck. How much did he gain or lose?

22. Three hundred lead pencils are divided among the clerks in an office. Each man receives 14 and there are 6 remaining. How many clerks in the office?

23. How many sheep at $6.75 each should be given in exchange for 54 horses worth $160 each?

24. If oranges are $37\frac{1}{2}$ cents per dozen, how many boxes, each containing 480, can be bought for $60?

25. A man can do a piece of work in $18\frac{3}{4}$ days. What part of it can he do in $6\frac{3}{8}$ days?

26. A man spent three-tenths of his money for clothes, and $\frac{1}{5}$ of it for rent, and had $75 left. How much did his clothes cost?

27. What would be the cost of 48,500 stamped envelopes at $21.30 per thousand?

28. How old to-day is a boy that was born Oct. 29, 1886?

29. At the rate of $5 per ton, what should be paid for 125 pounds of coal?

30. From ten and five hundredths take the sum of six ten-thousandths and 15 millionths, multiply the remainder by one-tenth, and divide the product by 5,000.

31. Reduce the following common fractions to decimals, and perform the operations indicated:

$$(\tfrac{11}{5000} \times 7\tfrac{1}{20}) \div \tfrac{141}{200000}.$$

32. A man died in 1892, aged 94; his son died in 1876, aged 47. How old was the man at the birth of his son?

33. Multiply the sum of $6\frac{3}{8}$ and $4\frac{3}{4}$ by their difference.

34. What will be the cost of 86,400 feet of gas at $1.25 per thousand feet?

35. What time elapsed between the discovery of America, Oct. 14, 1492, and January 1, 1892?

36. How many hats can be bought for $237.25, at the rate of $13 per dozen?

37. A clerk receives a salary of $1,500 per year, and his expenses are $968. In what time can he save enough to buy 133 acres of land at $28 per acre?

38. What will be the rent of a house for 1 year, 10 months, 6 days at $45 per month? (30 days to the month.)

39. The product is .00087, the multiplicand is 7.25. What is the multiplier?

40. A man sells cloth at $2.88 per yard, losing .04 of the cost. How much did he pay per yard?

41. A farm-hand agreed to work for $300 per year and a horse worth $60. If he leaves at the end of 9 months, how much is due him if he has already received $100 and the horse?

42. A train running 36 miles per hour leaves a station at 9 A.M. At 10:30 A.M. a second train leaves, and runs at the rate of 30 miles per hour. How many miles apart are the two trains at noon, if they run in the same direction?

DENOMINATE NUMBERS.

732. Slate Exercises.

Change:

1. 48 pounds and 9 ounces to ounces.
2. 34 rods and 3 yards to yards.
3. 2 miles to yards.
4. 3 days and 17 hours to hours.
5. 24 minutes and 15 seconds to seconds.
6. 8 tons and 1675 pounds to pounds.
7. 43 gallons and 8 quarts to quarts.
8. 75 gallons to pints.
9. 19 bushels and 3 pecks to pecks.
10. 19 bushels and 3 pecks to quarts.
11. $\frac{1}{32}$ ton to pounds and ounces.
12. .03125 ton to pounds and ounces.
13. $\frac{7}{9}$ yard to feet and inches.
14. .75 yard to feet and inches.
15. $\frac{7}{8}$ gallon to quarts and pints.
16. .625 gallon to quarts and pints.
17. $\frac{15}{32}$ bushel to pecks and quarts.

733. Philadelphia Public Schools. Oral Work.

1. $35 \times 4 - 14 + 16$
2. $[(56 \div 14) \times 12] - 12$
3. $\frac{3}{4} - \frac{1}{8}$
4. $\frac{3}{8} \div \frac{3}{4}$
5. $1\frac{1}{8} + 2\frac{1}{4}$
6. $\frac{5}{6} + 1\frac{3}{16}$
7. Find the greatest common divisor of 12, 18, 27.
8. Find the least common multiple of 8, 9, 12.

9. How many pints in 2 gal. 1 qt.?

10. How many eggs in 5 doz. and 6 eggs?

11. $\frac{5}{6} - \frac{3}{4}$ 12. $\frac{3}{4} + \frac{1}{2} + \frac{5}{8}$

13. $\frac{4}{7}$ = how many 28ths?

14. How many square inches in $\frac{1}{4}$ of a square foot?

15. Express the decimal $.3\frac{1}{3}$ as a simple fraction.

16. Express the decimal $.62\frac{1}{2}$ as a simple fraction.

734. Written Work.

1. Multiply twenty thousand nine hundred eight by sixteen. Divide the result by seven.

2. (*a*) Add three hundred seventy-six ten-thousandths, forty-five hundred-thousandths, five hundred sixty-eight thousandths, fourteen and fifteen hundredths.

(*b*) Divide two hundred sixteen by thirty-six thousandths. Take seventy-five hundredths from the quotient.

3. If one acre yields 14 bu. 3 pk. 7 qt. of cranberries, how much will 40 acres yield?

4. Find the difference between $3\frac{1}{3} \times 6\frac{3}{5}$ and $7\frac{1}{2} \div 1\frac{3}{5}$.

5. An errand boy receives \$2.75 per week. In how many weeks will he earn enough to buy a pair of boots worth \$3.25, a coat worth \$4.75, a hat worth \$1.50, and 6 handkerchiefs worth 25 cents each?

6. How many cords of wood at $\$5\frac{1}{4}$ a cord must I give for $78\frac{3}{4}$ bushels of wheat at \$1.20 a bushel, and 84 bushels of rye at \$1 a bushel?

7. Mr. Louis Scott bought from Thomas Green, at Philadelphia, January 10th, 1892, the following: 67 pairs of boots at \$3.25 per pair; 75 pairs of gaiters at \$1.12 per pair; 35 pairs of slippers at 70 cents per pair; 50 pairs of rubbers at $62\frac{1}{2}$ cents per pair. Make out and receipt the bill.

DENOMINATE NUMBERS.

735. Slate Exercises.

Change:

1. 975 ounces to pounds and ounces.
2. 396 inches to yards.
3. 517 hours to days and hours.
4. 1,694 seconds to minutes and seconds.
5. 9,314 pounds to tons and pounds.
6. 987 pints to gallons, quarts, and pints.
7. 1,485 quarts to pecks and quarts.
8. 185 pecks to bushels and pecks.
9. 840 hours to weeks.
10. 990 inches to rods. 5 rods to inches.

736. Blackboard Exercises. Review.

Write sums:

1. $24\frac{1}{3} + 18\frac{5}{6}$
2. $95\frac{3}{10} + 15\frac{7}{8}$
3. $83\frac{7}{12} + 19\frac{3}{4}$
4. $17\frac{3}{16} + 47\frac{1}{2}$
5. $11\frac{3}{14} + 11\frac{3}{4}$
6. $39\frac{3}{4} + 27\frac{1}{7}$
7. $64\frac{5}{8} + 19\frac{2}{3}$
8. $57\frac{4}{5} + 16\frac{3}{8}$
9. $35\frac{3}{4} + 18\frac{7}{16}$
10. $92\frac{7}{8} + 5\frac{1}{3}$

737. Write remainders:

11. $88\frac{3}{4} - 19\frac{1}{6}$
12. $74\frac{5}{8} - 37\frac{5}{16}$
13. $65\frac{2}{3} - 24\frac{1}{5}$
14. $32\frac{3}{4} - 18\frac{11}{12}$
15. $49\frac{1}{2} - 16\frac{4}{7}$
16. $47\frac{2}{3} - 35\frac{1}{4}$
17. $85\frac{1}{2} - 53\frac{2}{3}$
18. $90\frac{5}{7} - 43\frac{1}{2}$
19. $51\frac{3}{8} - 8\frac{2}{3}$
20. $27\frac{5}{6} - 24\frac{3}{4}$

DENOMINATE NUMBERS.

738. **Slate Exercises.**

Add:

1. 13 lb. 6 oz.
   5 lb. 9 oz.
   25 lb. 10 oz.

2. 19 yd. 1 ft.
   2 ft.
   3 yd. 1 ft.

3. 8 hr. 40 min.
   25 min.
   5 hr. 9 min.

4. 5 min. 30 sec.
   11 min. 25 sec.
   9 min. 18 sec.

5. 1 yd. 1 ft. 9 in.
   2 ft. 6 in.
   2 yd. 1 ft. 7 in.

6. 18 gal. 3 qt.
   9 gal. 1 qt.
   2 qt.

7. 11 bu. 3 pk.
   6 bu. 2 pk.
   2 pk.

8. 1 pk. 6 qt.
   1 pk. 7 qt.
   5 qt.

9. 3 wk. 5 da.
   6 wk. 6 da.
   1 wk. 3 da.

10. 11 T. 165 lb.
    4 T. 983 lb.
    1756 lb.

739. Subtract:

1. 8 lb.
   4 lb. 7 oz.

2. 15 yd. 1 ft.
   9 yd. 2 ft.

3. 17 hr.
   9 hr. 50 min.

4. 40 min. 30 sec.
   6 min. 45 sec.

5. 1 yd. 1 ft. 1 in.
   2 ft. 9 in.

6. 25 gal. 1 qt.
   6 gal. 3 qt.

7. 89 bu. 2 pk.
   67 bu. 3 pk.

8. 3 pk. 2 qt.
   2 pk. 7 qt.

9. 11 wk. 1 da.
   9 wk. 5 da.

10. 5 T. 896 lb.
    1984 lb.

CANCELLATION.

740. Slate Problems.

Indicate operations, and cancel where possible:

1. If 56 men can pave a street in 24 days, how long will it take 32 men to pave it?

2. When a vessel sails 168 miles a day, she completes her voyage in 14 days. In what time would she complete it if she sailed 196 miles a day?

3. If a field would support 64 sheep for 21 days, how long would it support 48 sheep?

4. If 42 men could build a wall in 24 days, how many men could build it in 18 days?

5. If 21 horses are worth as much as 35 cows, how many horses are worth as much as 55 cows?

6. A girl that wrote 36 letters to a line, took 15 lines in writing a piece of dictation. How many lines would a girl that wrote 30 letters to a line, require for the same dictation?

7. If a boy that steps 27 inches at a time takes 1,000 steps in going home from school, how many steps will be taken by a boy that steps 30 inches?

8. If 1,920 bricks will build a wall 15 yards long, how many bricks will be required for a similar wall 24 yards long?

9. A train going 44 miles an hour, went a certain distance in 9 hours. How long would a train take that went 36 miles an hour?

10. Find the cost of one-eighth of a barrel of flour (196 lb.), at the rate of 11 cents for $3\frac{1}{2}$ pounds.

11. Six men can do a certain piece of work in eighteen days. How long would it take eighteen boys to do the same work, if one man can do as much work as two boys?

741. U. S. Civil Service. Inspectors of Customs.

1. Add the following across, placing the totals in the spaces provided, and find grand total.

			Totals.
309	1,827	2,503	.....
207	7,520	5,391	.....
2,657	8,984	7,272	.....
7,777	6,575	2,488	.....
23,472	3,285	2,499	.....
5,755	2,765	2,357	.....
713	4,426	4,869	.....
8,890	515	3,689	.....
564	2,094	1,074	.....
6,284	290	7,997	.....
325	3,400	329	.....
491	9,399	5,001	.....
9,978	940	535	.....
70	614	2,802	.....
		Grand total....	.....

2. Express the following in sign and figures: Ten thousand one hundred one dollars and twelve and one-half cents.

3. Express in words the following figures and abbreviations: 10 cwt., 2 qr., 20 lb., 8 oz.

(qr. = quarter; *i.e.*, ¼ of a hundredweight.)

4. Express the following in figures:

MDCCCLXI. XIX. XCIV.

5. Divide a week (of 7 days) into eleven equal parts, expressing the answer in hours, minutes, and seconds.

6. At $1.66⅔ per yard, what will it cost to lay one width of carpeting through a passageway 72 feet in length?

7. Add 1.625 and 4.4375.

8. What is the difference between the amounts received in one year by two employees in the customs service, one of whom received $75 per month and the other 25 cents per hour, working 10 hours per day and 308 days in the year?

DENOMINATE NUMBERS.

742. Slate Exercises.

Multiply:

1. 12 lb. 7 oz. × 3
2. 3 hr. 10 min. × 7
3. 4 T. 985 lb. × 11
4. 7 bu. 3 pk. × 9
5. 3 wk. 4 da. × 4
6. 4 yd. 1 ft. × 5
7. 7 min. 18 sec. × 10
8. 9 gal. 3 qt. × 2
9. 2 ft. 9 in. × 8
10. 1 yd. 1 ft. 6 in. × 6

743. Divide:

11. 9 lb. 2 oz. ÷ 2
12. 31 gal. 2 qt. ÷ 9
13. 19 hr. 21 min. ÷ 3
14. 26 bu. 1 pk. ÷ 5
15. 41 min. 44 sec. ÷ 8
16. 18 yd. 2 ft. ÷ 7
17. 19 ft. 2 in. ÷ 10
18. 34 T. 936 lb. ÷ 4
19. 17 wk. 1 da. ÷ 6
20. 52 yd. 0 ft. 9 in. ÷ 11

744. Divide:

21. 18 lb. 4 oz. by 4 lb. 9 oz.
22. 16 yd. by 2 yd. 2 ft.
23. 2 da. 3 hr. 36 min. by 6 hr. 27 min.
24. 47 min. 42 sec. by 5 min. 18 sec.
25. 84 yr. 7 mo. by 12 yr. 1 mo.
26. 19 da. 3 hr. by 2 da. 3 hr.
27. 3 mi. 40 rd. by 125 rd.

28. 103 T. 808 lb. by 8 T. 1,234 lb.
29. 52 gal. 2 qt. by 3 gal. 2 qt.
30. 68 bu. 1 pk. by 5 bu. 1 pk.
31. 30 ft. 8 in. by 1 ft. 11 in.
32. 52 yd. 9 in. by 4 yd. 2 ft. 3 in.
33. 51 wk. 3 da. by 2 wk. 6 da.

MEASUREMENTS.

745. Slate Problems.

Make a diagram in each case:

1. A lot 25 ft. by 100 ft. has on it a house 25 ft. by 55 ft. How many square feet are there left for a yard?

2. How many square feet are there in the floor of a room 24 ft. long, 18 ft. wide?

3. How many square yards are there in the ceiling of the same room?

4. Find the number of square yards of plastering needed for the end wall of a room 18 ft. wide, 9 ft. high, after deducting for two windows each 6 ft. high, $4\frac{1}{2}$ ft. wide.

5. How many square yards of plastering will be needed for the opposite wall of the same room, 18 ft. wide, 9 ft. high, after deducting for a door $7\frac{1}{2}$ ft. high, 6 ft. wide?

6. Calculate the number of square yards of plastering needed for two side walls of a room 24 feet long, 9 feet high, after deducting for a fireplace 6 feet square on one side.

7. A house 30 ft. by 60 ft., with an addition 15 ft. square, is built upon a lot 100 ft. square. How many square feet of ground are covered by the building? How many square feet remain for a garden?

8. Measure the top of a brick and calculate the number of square inches in its surface. How many square inches in the surface of the bottom of the brick? Measure one side, and calculate its surface. How many square inches are there in the surface of the opposite side? How many square inches in each end?

9. Measure a crayon box, and calculate the number of square inches in each face.

10. Calculate the number of square feet in the floor of the class-room. In the ceiling. In each side wall. In each end wall.

PERCENTAGE.

746. *Per cent* means hundredths. Six per cent means six hundredths, $\frac{6}{100}$, or .06. It is written 6%.

747. Oral Exercises.

1. What is $\frac{6}{100}$ of 200?
2. Find .06 of 300
3. 6 per cent of 400
4. 6% of 50
5. 6% of 150
6. 6% of 250
7. 6% of 125
8. 6% of 75
9. 6% of 60
10. 6% of 160
11. 4% of 125
12. 7% of 500
13. 5% of 240
14. 1% of 600
15. $\frac{1}{2}$% of 600
16. $\frac{1}{4}$% of 600
17. $2\frac{1}{2}$% of 600
18. $3\frac{1}{4}$% of 400
19. $\frac{1}{8}$% of 400
20. 9% of 90

748. What fraction equals:

21. 25%
22. $12\frac{1}{2}$%
23. $33\frac{1}{3}$%
24. $16\frac{2}{3}$%
25. 20%
26. 50%
27. $6\frac{1}{4}$%
28. $3\frac{1}{3}$%
29. $6\frac{2}{3}$%
30. $37\frac{1}{2}$%
31. $62\frac{1}{2}$%
32. $87\frac{1}{2}$%

749. Find:

33. 50% of 96
34. 25% of 72
35. $12\frac{1}{2}$% of 120
36. $6\frac{1}{4}$% of 48
37. $33\frac{1}{3}$% of 36
38. $16\frac{2}{3}$% of 126
39. $8\frac{1}{3}$% of 72
40. 100% of 140
41. 200% of 140
42. 300% of 140
43. 150% of 140
44. 250% of 140
45. 125% of 140
46. 1% of 140
47. 1% of 350
48. 2% of 350
49. 3% of 350
50. 4% of 350

750. Slate Problems.

1. A house is valued at $24,500. How much taxes must the owner pay at the rate of $22.40 per $1,000 valuation?

2. A consignee sells a lot of cotton for $1,872.50. He receives 2% of this amount as commission. How much is his commission?

3. I loan $600 at 6% interest per year. How much interest should I receive from Jan. 1, 1892 to Jan. 1, 1894?

4. How much will it cost me to insure goods to the amount of $18,760 at one per cent?

5. A dealer imports books worth $548.40, on which he pays duty to the government at the rate of 25%. What is the amount of the duty?

6. Eighty per cent of a class of 55 pupils are promoted. How many are not promoted?

7. A man buys a house for $16,000 and sells it at a profit of 3 per cent. How much does he gain?

8. A clerk spends for rent 18 per cent of his income of $1,850 per year. What rent does he pay?

9. A girl spelled correctly 95 per cent of 60 words. How many did she miss?

10. Tea costing 40 cents per pound is sold at a profit of 50 per cent. What is the selling price?

751. Oral Problems.

1. What per cent does a boy receive if he solves 16 examples of the 20 given out?

2. What is the interest on $200 at 4% for 2 years?

3. If $2\frac{3}{4}$ yd. of calico cost 22 cents, how many yards can be bought for 60¢?

4. What part of a ton is 125 pounds?

5. How old, Dec. 1, 1892, was a boy born Sept. 1, 1879?

6. What is the cost of 3,500 bricks at $20 per M?

7. How many sheep, at $5 each, should be given in exchange for 12 horses, worth $200 each?

8. Reduce $\frac{1}{50}$ to a decimal.

9. One hundred fifty marbles are divided among a certain number of boys. Each receives 12 and there are 6 remaining. How many boys are there?

10. At 3 oranges for 5 cents, what will be the cost of 4 dozen oranges?

11. 75 men can do a certain piece of work in 9 days. How long will it take 45 men to do the same work?

12. If it takes 24 yards of carpet, a yard wide, to cover a floor, how many yards $\frac{3}{4}$ yd. wide will be needed for the same floor?

13. If 4 barrels of oil each containing 42 gallons are emptied into a tank of 200 gallons' capacity, how many more gallons will the tank hold?

14. Divide $\frac{2}{3}$ by $\frac{5}{7}$.

15. What decimal of a peck is 7 quarts?

16. Change .75 yd. to feet and inches.

752. Wilmington, Del., Public Schools. Examination Questions.

1. $\frac{3}{4}$ is what part of 2? Write a good solution of this question.

2. What will $\frac{2}{3}$ of a yard of cloth cost, if $\frac{4}{5}$ of a yard costs $1.60. Write a good solution of this question.

3. Divisor $3\frac{1}{8}$; quotient 400. Find dividend.

4. Dividend .014; quotient 2,000. Find divisor.

5. What is the product of one hundred by one-hundredth. Subtract 25 thousandths from 5.

6. Divide 118.35 by $.04\frac{1}{2}$ and add 3.0045 to the quotient.

7. If $1\frac{2}{3}$ yards of cloth are worth $11\frac{1}{4}$ dollars, what is a yard worth?

8. If a roll of carpet, containing 75 yards, is worth $132, what is $\frac{2}{5}$ of a yard worth?

9. How many quarts of berries at 11 cents a quart will it take to buy $2\frac{2}{3}$ yards of cloth at $16\frac{1}{2}$ cents a yard?

10. A man sold $\frac{1}{2}$ and $\frac{1}{5}$ of his farm and had $26\frac{2}{3}$ acres left. How many acres had he at first?

11. A boy sleeps $\frac{3}{8}$ of his time, plays $\frac{1}{6}$ of it, and goes to school one-half the remainder. How many hours is he in school each school-day?

12. Reduce to common fractions, and then find the sum of the common fractions: $.12\frac{1}{2}$, $.3\frac{1}{3}$, $.16\frac{2}{3}$.

13. Write in four other ways the quantity or value expressed by .16.

BILLS.

753. PHILADELPHIA, *Sept.* 24, 1894.

MR. HARRISON JARVIS

To WM. HART & SON, DR.

	To 50 lb. of Pipe	@	5½¢			
	" 3 Faucets	"	75"			
	" 1 Sink			4	75	
	" 3¾ days' Labor	"	$4.75			
						$

1. Copy and complete the above bill.

2. R. W. Jones has done 3½ days' work, @ $3.50 per day, for Charles Johnston. He charges for 850 ft. lumber at $2 per hundred; 5 lb. of nails at 9¢ per lb.; 3 locks @ 50¢; 2 bolts at 10¢. Make out his bill.

3. A gardener furnishes 3 rose-bushes at 75¢; 4 grape-vines at 50¢; 11 fuchsias at 30¢; 25 pansies at 10¢. He charges $3.25 per day for 2¾ days' labor. Make out his bill.

4. An upholsterer charges $3 per day for repairing some furniture. He supplies 6 lb. of hair at 50¢ per lb.; 17 yd. of plush at $1.75 per yd.; 3 papers of tacks at 10¢; cord, gimp, etc., 47¢. He works 4 days. Make out his bill.

5. Make out and receipt a bill for four articles bought to-day by John R. Brown from Smith and Robinson, grocers.

6. Make out a bill containing ten items bought by Mrs. S. W. Robb, at different times during October, 1894, from Frederick Loeser & Co., dealers in dry goods.

7. Make out a bill for labor done and materials furnished by Anthony Jones, gardener.

INTEREST.

754. Oral Exercises.

1. What will be the interest on $100 for 1 year at 4%?
2. On $200 for a year at 5%?
3. On $300 for a year at 6%?
4. On $400 for a year at 7%?
5. On $250 for a year at 4%?

At 4% per year, what will be the interest:

6. On $200 for 1 year?
7. On $300 for 2 years?
8. On $100 for 3 years?
9. On $200 for 1½ years?
10. On $200 for 1 year 6 months?
11. What will be the interest on $200 for 3 years at 5%?
12. On $300 for 2 years at 6%?
13. On $400 for 6 years at 3%?
14. On $100 for 5 years at 7%?
15. On $250 for 2 years at 4%?
16. On $100 for 1 year 6 months at 6%?
17. On $200 for 3 months at 4%?

At 4% per year, what will be the interest:

18. On $200 for 6 months?
19. On $300 for 4 months?
20. On $400 for 3 months?
21. On $300 for 2 months?
22. On $150 for 1 month?
23. Find the interest on $24 for 1 year at 5%.
24. On $36 for 1 year at 4%.
25. On $67 for 1 year at 3%.

755. Slate Exercises.

Find the yearly interest on:

1. $286.50 at 4%
2. $485 at 6%
3. $375.40 at 5%
4. $379 at 3%
5. $486 at 4½%
6. $186.75 at 4%
7. $199.50 at 2%
8. $636 at 3½%
9. $84.70 at 6%
10. $93.25 at 8%
11. $1,257 at 7%
12. $168 at 3¾%
13. $244 at 5½%
14. $890 at 7⅗%
15. $63.75 at 4%
16. $937.50 at 6%
17. $980.40 at 5%
18. $159.60 at 2½%
19. $1,357.37 at 7%
20. $2,146.18 at 4½%

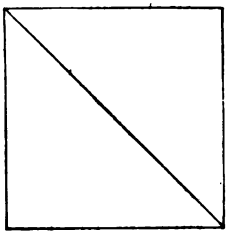
Find the interest on:

21. $290 for 2 years at 4%
22. $1,400 for 3 years at 4½%
23. $2,840 for 4 years at 5%
24. $1,250 at 6% for 3 years
25. $5,360 at 5½% for 2 years
26. $380 at 3% for 4½ years
27. $780 for 1 year 4 months at 6%
28. $2,560 for 2 years 6 months at 5%
29. $1,025 for 3 years 3 months at 4%
30. $1,296 for 7 months at 7%
31. $648 for 5 months at 5%
32. $275 for 4 months at 3%
33. $1,000 for 11 months at 6%

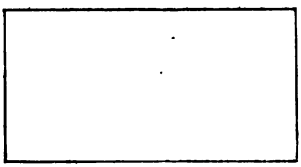
AREAS OF RIGHT-ANGLED TRIANGLES.

756. The square shown in the diagram is divided into two parts by a diagonal. One side of the square measures 10 feet.

1. Mark in each triangle its area.



Square.

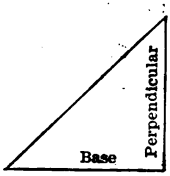


Rectangle.

2. Divide a rectangle 20 ft. by 12 ft. into two parts by a diagonal. Mark in each triangle its area.

3. Draw a right-angled triangle 3 in. by 4 in. Calculate its area in square inches.

4. How many square yards in the surface of a right-angled triangle whose base measures 30 feet, and whose perpendicular measures 22½ feet.



Find the area in *square feet* of the following right-angled triangles. (Change each dimension to feet.)

5. Base 20 yd., perpendicular 30 ft.

6. Base 16 in., perpendicular 3 ft.

7. Base 30 in., perpendicular 1 yd.

8. Base 3 ft. 6 in., perpendicular 5 ft.

9. Base 2 yd. 1 ft., perpendicular 1 yd. 9 in.

10. Base 50 yd., perpendicular 36 yd.

11. Base 112½ ft., perpendicular 30 yd.

12. Base 90 in., perpendicular 2 ft.

13. Base 12½ yd., perpendicular 13⅓ yd.

14. Base 1 rod, perpendicular 7½ ft.

15. Base 33⅓ ft., perpendicular 18 ft. 6 in.

757. St. Paul Public Schools. Examination Questions.

1. Bought 3 bu. 2 pk. 1 qt. of oats for $1.38 and retailed them at $.12½ a peck. What was the gain? Analyze.

2. From a hhd. of molasses containing 54 gal. 2 qt., there were sold 23 gal. 1 pt. What was the value of the remainder at 8 cents a quart? Analyze.

3. What is the result, if the sum of 5 yd. 2 ft. 4 in., 3 yd. 6 in., 14 yd. 1 ft. 2 in., be taken from 42 yd.?

4. How many iron rails, each 12 feet long, will be required to lay 4 miles of railroad track? Analyze.

5. Reduce $\frac{1}{8}$ of a day, $\frac{3}{7}$ of an hour, $\frac{4}{15}$ of a minute to common denominator, and add.

6. Bought a carriage for $180, and after paying 10% for repairs, sold it at a profit of 25% of the total cost. Find gain and selling price.

7. A man sold a horse for $125, and received in payment 12½ yards of cloth at $3.25 a yard, and the balance in tea at $.62½. How many pounds of tea did he receive?

8. Find equivalent per cents for the following: $\frac{1}{3}$, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{3}{5}$, $\frac{1}{12}$, $\frac{5}{4}$.

9. If 64 tons of iron cost $4,816, how many tons can be bought for $1,730.75? Analyze.

10. Change 28 gal. 3 qt. 1 pt. to pints.

SHORT METHODS.

758. Multiply. Do not reduce to improper fractions.

$12\frac{3}{4}$
$\times\ 4\frac{1}{8}$
51 4 times $12\frac{3}{4} = 51$; $\frac{1}{8}$ of $12\frac{3}{4} = 4\frac{1}{4}$.
$4\frac{1}{4}$
$55\frac{1}{4}$

1. $18\frac{3}{8} \times 6\frac{1}{2}$
2. $25\frac{5}{8} \times 8\frac{1}{5}$
3. $16\frac{1}{4} \times 5\frac{1}{2}$
4. $36\frac{1}{3} \times 9\frac{1}{8}$
5. $22\frac{5}{6} \times 6\frac{1}{11}$
6. $16\frac{3}{7} \times 7\frac{1}{5}$
7. $48\frac{3}{4} \times 12\frac{1}{8}$
8. $37\frac{3}{5} \times 10\frac{1}{6}$
9. $26\frac{5}{9} \times 9\frac{1}{3}$
10. $32\frac{3}{8} \times 8\frac{1}{7}$

759. Divide. Short Division.

11. $15)75\frac{3}{4}$
12. $13)169\frac{8}{10}$
13. $14)295\frac{5}{8}$
14. $12)976\frac{1}{2}$
15. $16)195\frac{3}{4}$
16. $17)199\frac{3}{5}$
17. $18)221\frac{1}{7}$
18. $12)865\frac{3}{4}$
19. $13)392\frac{1}{2}$
20. $14)567\frac{3}{4}$

760. Boston Examination Questions. Mental.

1. If the interest of \$1 is 6¢ a year, what is the interest of three dollars for two years?

2. If 8 men can do a piece of work in 6 days, in how many days can 4 men do it?

3. If 4 boxes of raisins cost \$7, what will 12 boxes cost?

4. A man having 75 dollars bought 7 sheep, and had \$5 left. What did he pay for each sheep?

5. A boy had 50 peaches and found 22 more; he then divided all of them equally among 9 boys. How many did he give to each?

6. I bought $2\frac{1}{8}$ lb. of sugar at one store and $3\frac{1}{2}$ lb. at another. How many pounds did I buy in all?

7. If Maria spends \$.75 a day, in how many days will she spend \$9?

8. At $16\frac{2}{3}$¢ a yard, what will 12 yd. of ribbon cost?

9. If $\frac{7}{8}$ of a load of hay is worth \$42, what will two loads be worth?

10. $2\frac{3}{4} \times 1\frac{1}{2} = ?$

11. $2\frac{3}{4} \div 1\frac{1}{2} = ?$

12. $\frac{3}{4}$ of my money equals 25¢. What is $\frac{1}{2}$ of it?

13. Least common multiple of 8, 12, 24?

14. Divide 6 by .03.

15. If 5 men can do a piece of work in 12 days, in how many days can 3 men do twice as much work?

16. John lost $\frac{1}{4}$ of his money and has 36¢ left. How much had he at first?

17. At 80¢ a lb., what do 4 oz. of tea cost?

18. If I have 12 yd. of ribbon, to how many girls can I give $\frac{3}{4}$ of a yard each?

19. If a table is 3 yd. long and 2 yd. wide, how many sq. ft. in it?

20. At 6¢ a qt., what will 10 qt. 1 pt. of milk cost?

21. A boy lives $10\frac{1}{2}$ rd. from his school. How far does he walk in a day to attend two sessions of school?

22. $\frac{1}{2}$ of 14 is $\frac{1}{6}$ of what number?

23. I bought a dozen oranges at the rate of 4 oranges for 3¢, and sold them at the rate of 3 oranges for 4¢. How much did I make?

24. How long would it take 3 men to cut a cord of wood, if 4 men can cut a cord in 5 days?

25. If you had $3\frac{1}{2}$ oranges to divide among your friends, giving each $\frac{1}{4}$ of an orange, to how many friends would you give?

26. John sold 24 tops at the rate of 3 tops for ten cents, and with the money bought pictures at 8¢ each. How many pictures did he buy?

27. How many pounds of cheese at $\frac{1}{12}$ of a dollar per pound can be bought for $\frac{2}{3}$ of a dollar?

28. 18 is $\frac{3}{7}$ of $\frac{7}{8}$ of what number?

29. If one man can do a piece of work in $11\frac{2}{3}$ days, in what time can 12 men do it?

30. How many times is $\frac{4}{5}$ contained in $2\frac{1}{3}$?

761. Boston Examination Questions. Slate.

1. A man carried to a store $75\frac{3}{4}$ bu. of potatoes, and received for them $27\frac{1}{2}$¢ a bu. How many yards of cloth at $17\frac{1}{2}$¢ a yd. would have paid for them?

2. What will 75 men earn in $18\frac{3}{4}$ days, if each earns $2\frac{2}{15}$ dollars each day?

3. What will 8 yd. 2 ft. 6 in. of silver wire cost at $8\frac{1}{2}$¢ an inch?

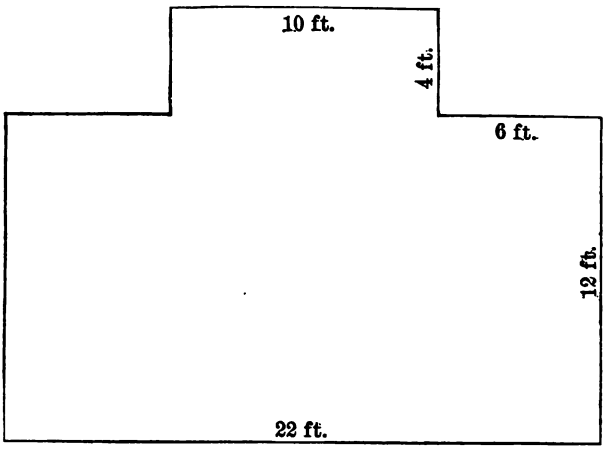
4. A young man spent $\$195\frac{1}{2}$ during his first term at college, which was $\frac{1}{3}$ of his year's allowance. What was his year's allowance, and what had he left for the remainder of the year?

5. A man paid $\$18.66\frac{2}{3}$ for a load of hay weighing $2\frac{1}{3}$ tons. At the same rate, what should he pay for $\frac{3}{4}$ of a ton?

6. How many flag-stones, each 4 ft. long and 2 ft. wide, will be needed to lay a crossing 232 ft. long and 6 ft. wide? What will be the cost of them at the rate of $50 for 100 stones?

7. Change to common fractions .0075 and .625.

8. What will it cost to put moulding around a room shaped like the drawing, allowing 3 inches on every corner for matching, the moulding being worth $5\frac{3}{8}¢$ a foot?



9. Divide 4.5006 by .015.

Change to decimals $\frac{5}{15}$, $\frac{9}{25}$, and $5\frac{7}{8}$, and add the results.

10. One boy has $\frac{75}{800}$ of an orange, his sister has $\frac{450}{675}$ of one, and his brother has $\frac{36}{216}$ of one. Reduce these fractions to lowest terms, and find how many oranges they all have.

11. If it takes 11 men $45\frac{3}{8}$ days to do a piece of work, how many days will it take one man to do the same work?

12. I owned $\frac{3}{5}$ of a house, and sold $\frac{3}{4}$ of my share for $1,750. What was the value of the whole house at that rate?

13. A grocer, after selling $\frac{1}{8}$, $\frac{2}{5}$, $\frac{3}{20}$, and $\frac{1}{4}$ of a quantity of sugar, had 102 pounds left. How many pounds did he have at first?

14. A field is 40 rd. long and 26 rd. wide. What is the distance around it in feet?

15. What will it cost to carpet a room 18 ft. long, 15 ft. wide, at $1.75 a sq. yd.?

16. A dealer in grain bought wheat at 94¢ a bushel to the amount of $59.22, and sold it for $70.56. What was the selling price per bushel?

17. If $\frac{5}{8}$ of a cord of wood is worth $3.75, what will $\frac{3}{4}$ of a cord cost?

18. A man who had 50\frac{1}{2}$, received 8\frac{1}{4}$ more, spent 17\frac{3}{4}$, lost 4\frac{3}{10}$, and collected 15\frac{1}{2}$ of a debt. How much money had he then?

19. Cost of fencing a lot 26 rd. long by 20 rd. wide at 25¢ per foot?

20. How many paving tiles 3 inches square are needed to cover a floor 18 ft. long, 10 ft. wide?

21. My field is 100 rods long and 75 rods wide. How much is it worth at $2 a sq. rod? How much will it cost to fence it at $1 a rod?

22. $12\frac{3}{7}$ is what part of 29?

23. What must a carpenter pay for the following: 6,500 shingles, at $4.75 per thousand; 15,964 feet of boards, at $39.25 per thousand; 4,849 feet of planks, at $45.32 per thousand?

24. A farmer sold $\frac{5}{8}$ of his wheat for 796\frac{3}{5}$ and received for it 1\frac{1}{10}$ per bushel. How many bushels did he have at first, and how many did he sell?

25. If 123 tons of coal cost $848.70, what will be the cost of 265 tons?

26. A woman bought 16 yd. of cloth at 70¢ a yd.; she paid $5 in cash, and the rest in butter at 20¢ a pound. How many pounds of butter did she pay?

27. If a man walks $\frac{7}{12}$ of a mile in 10 minutes, how far can he walk in an hour and a half?

28. $\frac{2}{3}$ of $\frac{6}{7}$ of $\frac{1}{2}$ of $\frac{21}{22}$ of $\frac{33}{35}$ = ?
Define Denominator and Mixed Number.

29. A dealer sold $\frac{5}{12}$ of his wheat to Mr. Adams, $\frac{1}{3}$ of it to Mr. Baker, and $\frac{5}{18}$ of it to Mr. Charles; then he had 630 bu. left. How much had he at first?

30. Mr. Blank bottled 135 gal. of ink in bottles that held $\frac{3}{8}$ of a pint; he sold it for $12\frac{1}{2}$¢ a bottle. How much did he receive?

762. Kansas City Public Schools. Examination Questions.

Mental:

1. What will 2 cwt. of coffee cost at the rate of 4 lb. for 90¢?

2. A watch and a chain cost $150; $\frac{2}{3}$ of the cost of the watch, plus $15, equals $95. Give the cost of each.

3. What will 4 spoons cost at $5.76 a gross?

4. What will be the cost of 3 pecks of cherries at 2¢ a pint?

5. Three times a number, increased by $\frac{6}{10}$ of the number, equals 22. What is the number?

6. Show the difference between 2 square inches and 2 inches square.

7. If 3 pwt. of gold are worth $1.50, what are 3 ounces worth? (20 pwt. (pennyweights) = 1 ounce.)

8. If one-half a peck of apples costs 18¢, what will a bushel and a half cost?

REVIEW.

763. Answers in fractions:

1. Simplify $\frac{2+5\frac{1}{7}-3\frac{2}{5}}{3+1\frac{1}{7}-2\frac{3}{5}}$.

2. Add $\frac{4}{5}$, $\frac{5}{16}$, $\frac{7}{20}$, $\frac{8}{25}$, $\frac{19}{400}$.

3. Reduce $\frac{1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}}{1+\frac{1}{2}-\frac{1}{3}-\frac{1}{4}}$ to a simple fraction.

4. Divide $(\frac{1}{2}+\frac{1}{3}+\frac{2}{5})$ by $(\frac{6}{7}\times\frac{11}{12}\times\frac{14}{55})$.

5. Simplify $\frac{1+\frac{1}{2}}{1-\frac{1}{2}}$ of $\frac{2}{3}$ of $\frac{1}{1\frac{1}{2}}$.

6. $\frac{7\frac{1}{7}-3\frac{1}{3}}{7\frac{1}{2}}=?$

7. Find the value of $\frac{4\frac{1}{5}+(\frac{2}{3}\text{ of }\frac{7}{16})}{(\frac{5}{8}\text{ of }1\frac{1}{6})-\frac{3}{5}}$.

8. $(2\frac{1}{2}+1\frac{1}{3})\div(2\frac{1}{2}+3\frac{1}{3})=?$

9. Find the value of $2\frac{1}{2}$ times the quotient of $(3-2\frac{1}{4})\div(2\frac{1}{2}-\frac{5}{8})$.

10. $3\frac{4}{5}+14-7\frac{2}{3}+5-\frac{2}{15}=?$

764. Answers in decimals:

11. Divide the sum of .736 and 1.2854 by their difference.

12. Divide .1 by .2 and .35 by 35, and find the product of the quotients.

13. Reduce $\frac{7}{5120}$ to a decimal, and divide it by .3125.

14. Divide .12096 by .032.

15. Multiply .00273 by 3,000.456, and divide the product by .08.

16. Divide 12.3125 by .000625.

17. Divide 51.5 by 412, and 412 by 51.5.

18. Multiply 31.5 by 27.9, and divide the product by 9.765.

19. Reduce $\frac{4.25}{3+\frac{1}{8}}$.

20. Find the value of $\frac{.0021 \times 3.004}{.024}$.

765. Reduce to lowest terms:

1. $\frac{69}{253}$
2. $\frac{215}{688}$
3. $\frac{429}{762}$
4. $\frac{861}{986}$
5. $\frac{877}{1189}$
6. $\frac{847}{3003}$
7. $\frac{1728}{6336}$
8. $\frac{3900}{6218}$
9. $\frac{2157}{6752}$
10. $\frac{3828}{6699}$
11. $\frac{3218}{6049}$
12. $\frac{6587}{6706}$

CHAPTER IX.

DENOMINATE NUMBERS. — SURFACES AND VOLUMES. — PERCENTAGE. — INTEREST.

REDUCTION OF DENOMINATE NUMBERS.

766. Reduce 5 gal. 3 qt. 1 pt. to pints.

In 5 gal. there are 20 qt. Adding the 3 qt., we have 23 qt. Multiplying by 2 to reduce to pints, and adding in 1 pt., we get the answer, 47 pints.

5 gal. 3 qt. 1 pt.
4
23 qt.
2
47 pt. *Ans.*

767. Reduction Descending. Slate Exercises.

Reduce to pints:

1. 16 gal. 1 qt. 1 pt.
2. 27 gal. 2 qt.
3. 16 gal.
4. 16 gal. 1 pt.
5. 34 gal. 3 qt. 1 pt.
6. 31½ gal.
7. 9 gal. 2½ qt.
8. 10 gal. 2 qt. 1 pt.
9. 27 gal. 1 pt.
10. 4 gal. 3 qt. 1½ pt.

768. Change 67 pt. to gallons, quarts, and pints.

2 | 67 pt.
4 | 33 qt. 1 pt.
8 gal. 1 qt. 1 pt. *Ans.*

769. Reduction Ascending.

Change to gal., etc.:

11. 156 qt.
12. 79 qt.
13. 408 pt.
14. 1,302 pt.
15. 63 pt.
16. 277 pt.
17. 139 pt.
18. 171 qt.
19. 63 qt.
20. 711 pt.

770. Reduction Descending.

21. Change 17 yd. 1 ft. 9 in. to inches.
22. 4 mi. 100 rd. 4 yd. to yards.
23. 74 bu. 2 pk. 7 qt. to quarts.
24. 156 lb. 11 oz. to ounces.
25. 63 yd. 0 ft. 3 in. to inches.
26. 19 bu. 0 pk. 3 qt. to quarts.
27. 11 rd. $3\frac{1}{2}$ yd. to feet.
28. 63 gal. 3 qt. to pints.
29. 3 bu. 6 qt. to quarts.
30. 17 T. 369 lb. to pounds.
31. 15 hr. 16 min. to seconds.
32. 4 wk. 6 da. 11 hr. to hours.
33. $\frac{5}{7}$ of a week to hours.
34. $\frac{3}{8\frac{1}{2}}$ of a mile to yards.
35. .00125 T. to ounces.

771. Reduction Ascending.

Change:

36. 1,876 in. to yd., etc.
37. 475 oz. to lb., etc.
38. 729 qt. to bu., etc.
39. 8,675 min. to da., etc.
40. 4,972 lb. to T., etc.
41. 972 rd. to mi., etc.
42. 117 pt. to gal., etc.
43. 9,483 sec. to hr., etc.
44. 877 qt. to bu., etc.
45. 1,495 oz. to lb., etc.
46. 373 in. to yd., etc.
47. 216 qt. to gal., etc.
48. 876 rd. to mi., etc.
49. 319 pt. to gal., etc.
50. 3,520 yd. to mi.

772. Oral Exercises.

1. How many hours in $\frac{2}{3}$ of a day?
2. How many hours in $\frac{1}{3}$ of a day?
3. How many minutes in $\frac{1}{3}$ of an hour?
4. How many hours and minutes in $\frac{1}{3}$ of a day?
5. How many quarts and pints in $\frac{3}{8}$ of a gallon?
6. How many hours and minutes in .2 day?
7. How many quarts and pints in .375 gallon?
8. Change .3 day to hours and minutes.
9. Change .625 bu. to pk. and qt.
10. What part of a gallon is 1 pt.?
11. What part of a gallon is 3 pt.?
12. What part of a gallon is 1 qt. 1 pt.?
13. What decimal of a gallon is 1 qt. 1 pt.?
14. What decimal of a gallon is 2 qt. 1 pt.?
15. What part of 2 gallons is 2 qt. 1 pt.?
16. Change .375 bu. to pt. and qt.
17. What decimal of a bu. is 4 qt.?
18. What fraction of a day is 3 hr. 20 min.?
19. Reduce 960 min. to hours.
20. How many minutes in a day?

773. Slate Exercises.

1. What decimal of a ton is 3 lb.?
2. What fraction of a day is 12 min. 30 sec.?
3. Reduce $\frac{1}{8\frac{1}{2}}$ of a day to minutes.
4. Reduce .03125 day to minutes.

5. What decimal of a day is 9 minutes?

6. What will be the cost of 15 T. and 750 lb. coal at $5 per ton?

7. If coal is $5 per ton, how much can be bought for $18.76?

8. If 7 T. 296 lb. coal cost $35.74, how much will I have to pay for 18,748 lb.?

9. A man pays $48.92 for 9 T. 1,568 lb. coal. How many tons, etc., would he receive for $73.11?

10. Change 2 ft. 7 in. to the fraction of a yd.

11. Reduce 3 pk. 4 qt. 1 pt. to the decimal of a bu.

12. How many pk., qt., etc., in .9375 bu.?

13. If .1875 of a gal. of cologne cost $1.125, what will 1 pt. cost?

14. Find the cost of 42 gal. 3 qt. 1 pt. oil, at 16¢ per gal.

15. Reduce $\frac{11}{16}$ of a gal. to qt. and pt.

16. What part of 3 T. is 1 T. 960 lb.?

17. A man raised 139 bu. 2 pk. and 2 qt. of rye. He sold 119 bu. 2 pk. 4 qt. What fraction of his crop did he sell?

18. 10 bu. 1 pk. of seed is packed in 8 bags. How much is there in each bag?

19. What decimal of a day is 21 hr. 14 min. 24 sec.?

20. How many feet in a mile?

COMPOUND ADDITION.

774. Add the following:

1.		2.	
17 lb.	3 oz.	18 bu.	3 pk. 7 qt.
4 lb.	9 oz.	9 bu.	2 pk. 4 qt.
23 lb.	12 oz.	14 bu.	1 pk. 6 qt.
	15 oz.		2 pk.

3. 16 yd. 2 ft. 9 in.
17 yd. 4 in.
1 ft. 6 in.
11 in.

4. 11 da. 5 hr. 19 min.
23 da. 40 min.
17 hr. 50 min.
5 da. 20 hr. 6 min.

5. 93 gal. 3 qt. 1 pt.
74 gal.
18 gal. 1 qt.
2 qt. 1 pt.

6. 5 hr. 30 min. 20 sec.
45 min. 33 sec.
6 hr. 11 min. 5 sec.
10 hr. 3 min. 30 sec.

7. 12 T. 1,576 lb.
3 T. 980 lb.
476 lb.
1 T. 1,830 lb.

8. 2 wk. 5 da. 12 hr.
6 da. 15 hr.
5 wk. 2 hr.
2 da. 19 hr.

9. 18 mi. 100 rd.
34 rd.
29 mi.
6 mi. 160 rd.

10. 47 yr. 11 mo.
5 yr. 9 mo.
7 mo.
22 yr. 5 mo.

11. 487 T., 316 T. 1,816 lb., 247 lb., 43 T. 811 lb., 19 T. 25 lb.

12. 83 lb. 15 oz., 9 lb. 5 oz., 18 lb., 22 lb. 11 oz., 5 lb. 8 oz., 12 oz.

13. 8 hr. 15 min. 5 sec., 37 min. 52 sec., 5 hr. 48 min., 23 hr. 59 min. 5 sec.

14. 72 gal. 3 qt. 1 pt., 17 gal. 1 qt., 2 qt. 1 pt., 90 gal. 1 pt.

15. 7 yd. 2 ft. 11 in., 19 yd. 6 in., 105 yd., 4 yd. 2 ft. 2 in., 1 ft.

16. 93 mi. 300 rd., 87 mi. 154 rd., 194 rd., 3 mi. 175 rd., 9 mi.

17. 82 yr. 1 mo., 19 yr. 10 mo., 25 yr. 9 mo. 6 da., 8 mo. 15 da.

18. 4 wk. 6 da. 17 hr., 20 wk. 5 da., 4 da. 11 hr., 9 wk. 5 da. 1 hr.

19. 5 hr. 13 min. 23 sec., 16 hr. 27 min. 30 sec., 43 min. 5 sec., 24 sec.

20. 8 bu. 3 pk. 7 qt., 5 qt., 2 pk. 1 qt., 4 bu. 6 qt., 3 bu. 1 pk. 1 qt.

775. Find answers:

21. 19 lb. 12 oz.
+ ?
37 lb. 3 oz.

22. 14 bu. 2 pk. 4 qt.
+ ?
18 bu. 1 pk. 1 qt.

23. 7 yd. 2 ft. 7 in.
+
15 yd. 2 ft. 2 in.

24. 19 da. 14 h. 40 min.
+
30 da.

25. 14 gal. 2 qt. 1 pt.
+
18 gal. 1 qt.

26. 10 hr. 15 min. 30 sec.
+
24 hr.

27. 246 T. 1,876 lb.
+
493 T. 1,552 lb.

28. 9 wk. 6 da. 11 hr.
+
21 wk. 3 hr.

29. 84 mi. 24 rd.
+
100 mi. 15 rd.

30. 13 yr. 9 mo.
+
25 yr.

31. 83 lb. 4 oz. + ? = 100 lb.

32. 16 bu. 2 qt. + ? = 25 bu. 1 pt.

33. 1 ft. 4 in. + ? = 9 yd. 1 in.

34. 47 da. 15 min. + ? = 60 da.

35. 93 gal. 3 qt. 1 pt. + ? = 150 gal.

COMPOUND SUBTRACTION.

776. Subtract:

36. 83 yr. 3 mo.
15 yr. 9 mo.

37. 62 mi. 84 rd.
19 mi. 159 rd.

38. 76 T. 225 lb.
37 T. 1,679 lb.

39. 100 lb.
83 lb. 4 oz.

40. 52 wk.
13 wk. 3 da. 7 hr.

41. 19 gal. 1 pt.
8 gal. 3 qt.

42. 18 hr. 5 min.
40 min. 25 sec.

43. 16 yd. 9 in.
7 yd. 1 ft. 11 in.

44. 100 bu.
42 bu. 3 pk. 7 qt.

45. 45 da. 1 hr. 1 min.
6 da. 6 hr. 6 min.

46. From 27 bu. 1 pk. 5 qt. take 13 bu. 3 pk. 7 qt.

47. From 100 gal. 1 qt. take 83 gal. 2 qt. 1 pt.

48. From 22 hr. 15 min. 20 sec. take 15 hr. 45 min. 40 sec.

49. From 17 lb. 2 oz. take 13 lb. 8 oz.

50. From 100 bu. take 74 bu. 2 pk. 1 qt.

COMPOUND MULTIPLICATION.

777. Add 3 lb. 9 oz.
3 lb. 9 oz.

Add 4 gal. 3 qt. 1 pt.
4 gal. 3 qt. 1 pt.
4 gal. 3 qt. 1 pt.

Multiply 3 lb. 9 oz. by 2.

Multiply 4 gal. 3 qt. 1 pt. by 3.

778. Multiply:

51. 13 bu. 3 pk. 6 qt. by 2.
52. 25 gal. 2 qt. 1 pt. by 3.
53. 7 lb. 10 oz. by 4.
54. 3 hr. 15 min. 15 sec. by 5.
55. 23 bu. 3 qt. by 6.
56. 32 gal. 1 pt. by 7.
57. 25 lb. 4 oz. by 8.
58. 33 min. 33 sec. by 9.
59. 2 pk. 7 qt. by 10.
60. 3 qt. 1 pt. by 11.
61. 4 yr. 6 mo. by 12.
62. 5 wk. 6 da. 12 hr. by 16.
63. 4 T. 250 lb. by 18.
64. 3 yd. 1 ft. 6 in. by 22.
65. 2 mi. 15 rd. by 32.
66. 4 hr. 15 min. 20 sec. by 9.

67. 31 gal. 2 qt. by 42.
68. 4 qt. by 37.
69. 43 sec. by 215.
70. 4 wk. 6 da. 20 hr. by 19.
71. 1 bu. 2 pk. 3 qt. by 13.
72. 4 yd. 2 ft. 9 in. by 15.
73. 21 hr. by 24.
74. 3 yr. 11 mo. by 14.
75. 1 gal. 1 qt. 1 pt. by 30.

COMPOUND DIVISION.

779. Divide:

76. 15 lb. 9 oz. by 3.
77. 2 lb. 3 oz. by 5.
78. 2 gal. 1 qt. by 3.
79. 5 bu. by 4.
80. 7 hr. by 6.
81. 17 lb. 7 oz. by 3.
82. 37 bu. 3 pk. 6 qt. by 2.
83. 67 yd. 2 ft. by 4.
84. 33 da. 15 hr. 57 min. by 3.
85. 563 gal. by 6.
86. 22 hr. 20 min. 20 sec. by 4.
87. 112 T. 125 lb. by 5.
88. 13 wk. by 5.
89. 74 mi. 80 rd. by 4.
90. 69 yr. by 12.
91. 27 bu. 3 pk. 4 qt. by 2.
92. 76 gal. 3 qt. 1 pt. by 3.
93. 5 hr. 1 min. 57 sec. by 9.
94. 33 wk. 3 da. by 12.
95. 36 yd. 6 in. by 7.
96. 45 bu. 6 qt. by 6.
97. 20 da. 13 hr. 4 min. by 16.
98. 15 gal. 3 qt. by 18.
99. 54 yd. 1 ft. 4 in. by 20.
100. 41 wk. 4 da. 1 hr. ÷ 4.
101. 457 hr. 37 min. 30 sec. ÷ 9.
102. 147 gal. 3 qt. 1 pt. ÷ 13.
103. 157 bu. 3 pk. 6 qt. ÷ 7.
104. 175 yd. 2 ft. 6 in. ÷ 10.
105. 188 mi. 12 rd. 2 yd. ÷ 6.
106. 311 da. 21 hr. 36 min. ÷ 12.

107. Divide 180 da. 3 hr. 4 min. by 16.

780. Dividing 180 days by 16, we get 11 days quotient and 4 days remainder. Reducing 4 days to hours and adding 3 hours, the next dividend is 99 hours. This gives 6 hours quotient, 3 hours remainder. Reducing to minutes and adding 4 minutes, the next dividend is 184 minutes. This gives 11 minutes quotient, and 8 minutes remainder. Reducing, we have 480 seconds for next dividend. Dividing, as before, the last quotient is 30 seconds.

11 da. 6 hr. 11 min. 30 sec.
16)180 da. 3 hr. 4 min.
20
4 da. (remainder)
24
99 hr.
3 hr. (remainder)
60
184 min.
24
8 min. (remainder)
60
480 sec.
0

108. Divide 236 gal. 1 qt. by 18.

109. 334 yd. 9 in. by 21.

781.

15 yd. 2 ft. 9 in.
21)334 yd. 0 ft. 9 in.
124
19 yd. (remainder)
3
57 ft.
15 ft. (remainder)
12
189 in.
0

110. 825 lb. by 48.

111. 112 T. by 25.

112. 43 mi. by 32.

113. 84 yr. by 24.

114. 462 bu. by 36.

115. 1,078 yd. by 63.

116. 288 hr. 9 min. by 54.

117. 863 gal. 2 qt. 1 pt. by 47.

118. 33 wk. 1 da. by 72.

119. 1,138 T. 910 lb. by 81.

120. 1,629 yd. 1 ft. by 96.

121. 1,867 gal. $1\frac{1}{2}$ pt. by 125.

782. Oral Problems.

1. How many tons and pounds of coal in 40 bags, each containing 80 pounds?

2. If it takes 3 hr. 20 min. to hoe a row of corn, how long will it take to hoe 3 rows?

3. A man puts up $3\frac{1}{2}$ pounds of tea into 4 oz. packages. How many packages does he make?

4. 3 pecks 3 quarts of apples are divided among 9 children. What quantity does each child receive?

5. What part of a day is 30 minutes?

6. If there are $2\frac{1}{4}$ gallons of wine in 12 bottles, how many pints are there in each bottle?

7. What is the weight of two packages each containing 15 lb. 11 oz.?

8. What part of an hour is 40 seconds?

9. What is the rent of a house for 1 year 9 months at $16 per month?

10. If 3 gal. 2 qt. 1 pt. of milk are taken from a can containing 10 gal., how much is left in the can?

11. 5 hams weigh $61\frac{1}{4}$ lb. What is the average weight?

12. There are on an average 41 pupils in a class. How many are there in 14 classes?

13. At $37\frac{1}{2}$ cents per yard, how many yards can be bought for $6.75?

14. Find the cost of 16 bbl. of flour at $6.12\frac{1}{2}$ each.

15. $1.65 is equally divided among 15 boys. What is the share of each?

16. A floor containing $40\frac{1}{4}$ square yards is 7 yards long. How many yards wide is it?

17. How many ounces in $5\frac{7}{8}$ pounds?

783. Slate Problems.

1. If a watch gains 1 min. 17 sec. per day, how much will it gain during March and April?

2. How many bu., pk., and qt. in 1,449 lb. corn, weighing 56 lb. to the bu.?

3. A chain, 97 yd. 8 in. long, contains 1,000 links. Find the length of one of the links.

4. A farmer sold out of 5 bu. of peas the following quantities: 3 pk. 6 qt.; 4 pk; 4 pk. 3 qt.; 1 bu. 1 pk. 1 qt. How much has he still to sell?

5. A man walks on Monday 15 mi. 161 rd.; Tuesday, 10 mi. 84 rd.; Wednesday, 19 mi. 15 rd.; Thursday and Friday, 12 mi. 121 rd. each day; Saturday, 14 mi. 240 rd. What distance per day does he average?

6. If the sun rises at 5 hr. 10 min. A.M., and sets at 6 hr. 42 min. P.M., how long is the day? How many hours and minutes of night?

7. An iron rod is 12 ft. 6 in. long. From it are cut 73 bolts, each $1\frac{3}{4}$ in. long. How much is left?

8. A man rows a mile in 10 min. 30 sec. How long would he take to row 27 miles at the same rate?

9. A man rows 51 miles in 23 hr. 5 min. and 30 sec. How long does he take to row a mile?

10. If I lost \$50 by selling a lot for two-thirds of its cost, what would I have lost if I had sold it for three-fourths of its cost?

11. At the rate of \$2.75 per day of 10 hours, how much should be given a man that works from a quarter before 8 until 5 minutes past 11?

12. If a railroad train travels 18 miles in 40 minutes, how far will it travel, at the same rate, in $7\frac{1}{2}$ hours?

SPECIAL DRILLS.

784. Give sums:

$163 + 137$	$42 + 35 + 77$	$185 + 546$	$4{,}170 + 470$
$256 + 184$	$63 + 19 + 54$	$668 + 193$	$1{,}260 + 850$
$149 + 312$	$87 + 22 + 48$	$167 + 734$	$2{,}140 + 680$
$458 + 197$	$91 + 63 + 17$	$476 + 155$	$3{,}450 + 390$

785. Give differences:

$400 - 163$	$540 - 384$	$7{,}310 - 6{,}850$	$618 - 495$
$501 - 375$	$361 - 149$	$8{,}610 - 7{,}680$	$455 - 128$
$275 - 137$	$455 - 358$	$5{,}000 - 4{,}670$	$648 - 509$
$650 - 488$	$662 - 176$	$4{,}960 - 4{,}380$	$856 - 147$

786. Give products:

11×15	$48 \times 16\frac{2}{3}$	21×15	28×75
12×14	$32 \times 37\frac{1}{2}$	22×14	$40 \times 87\frac{1}{2}$
13×13	$24 \times 62\frac{1}{2}$	31×13	$39 \times 33\frac{1}{3}$
14×14	$36 \times 66\frac{2}{3}$	41×14	49×25

787. Give quotients:

$165 \div 15$	$616\frac{2}{3} \div 16\frac{2}{3}$	$135 \div 45$	$933\frac{1}{3} \div 66\frac{2}{3}$
$168 \div 14$	$837\frac{1}{2} \div 37\frac{1}{2}$	$136 \div 68$	$975 \div 75$
$169 \div 13$	$733\frac{1}{3} \div 33\frac{1}{3}$	$220 \div 44$	$612\frac{1}{2} \div 87\frac{1}{2}$
$294 \div 14$	$687\frac{1}{2} \div 62\frac{1}{2}$	$196 \div 49$	$925 \div 25$

788. Give answers:

$13\frac{3}{4} \times 5$	$51\frac{5}{6} \div 2$	$24 \div 2\frac{2}{3}$	$21 \times 3\frac{3}{7}$
$14\frac{2}{3} \times 4$	$40\frac{3}{8} \div 7$	$18 \div 4\frac{1}{2}$	$22 \times 4\frac{2}{11}$
$14\frac{3}{10} \times 7$	$34\frac{2}{5} \div 2$	$49 \div 1\frac{3}{4}$	$18 \times 3\frac{5}{6}$
$13\frac{2}{11} \times 8$	$48\frac{2}{3} \div 3$	$35 \div 3\frac{1}{2}$	$17 \times 4\frac{1}{4}$

789. Oral Problems.

1. How many ounces in $11\frac{3}{16}$ lb.?

2. 258 yd. equal how many ft.?

3. A dealer bought 652 tons of coal and sold 476 tons. How much had he left?

4. Sold my wheat for \$347 and my oats for \$154. How much did I receive for both?

5. $40\frac{5}{8}$ yd. of ribbon are cut into 7 pieces. Find the length of each piece.

6. How many sq. yd. in a floor $5\frac{1}{2}$ yd. long and $5\frac{1}{2}$ yd. wide?

7. What will be the cost of 14 lb. of lard at 14¢ per lb.?

8. At $1\frac{1}{2}$¢ each, how many lead pencils can I buy for 27¢?

9. What part of a 196-lb. barrel of flour is contained in a 49-lb. bag?

10. At 45¢ per yd., how much lace can be bought for \$1.35?

11. A woman has saved \$833. How much more must she save to have \$1,000?

12. What will be the cost of 16 lb. of sugar at $4\frac{3}{8}$¢ per lb.?

13. Spent \$2.56 for dry goods and \$1.84 for groceries. How much did I spend for both?

14. Find the cost of 3 lb. 10 oz. of butter at 32¢ per lb.

15. At \$.375 per yd., how much ribbon can be bought for \$.75?

16. If it takes $1\frac{7}{8}$ yd. of cloth to make a jacket, how many can be made from a piece of cloth containing 30 yd.?

17. A boy paid 50¢ for the use of a boat for $3\frac{1}{2}$ hours. What was the price per hour?

18. If 13 pounds of raisins cost \$1.69, what is the cost of 1 pound?

TABLE.

FOREIGN COMMERCE OF THE UNITED STATES.

EXPORTS AND IMPORTS, 1875–1891.

790. The following table shows the values of the exports and the imports of merchandise during each year from 1875 to 1891, inclusive.

IMPORTS AND EXPORTS OF MERCHANDISE.

Year ending June 30.	Exports.	Imports.	Excess of exports.	Excess of imports.
1875	$513,442,711	$533,005,436		
1876	540,384,671	460,741,190		
1877	602,475,230	451,323,126		
1878	694,865,766	437,051,532		
1879	710,439,441	445,777,775		
1880	835,638,658	667,954,746		
1881	902,377,346	642,664,628		
1882	750,542,257	724,639,574		
1883	823,839,402	723,180,914		
1884	740,513,609	667,697,693		
1885	742,189,755	577,527,329		
1886	679,524,830	635,436,136		
1887	716,183,211	692,319,768		
1888	695,954,507	723,957,114		
1889	742,401,375	745,131,652		
1890	857,828,684	789,310,409		
1891	884,480,810	844,916,196		
Total.				

Find the excess of exports or of imports for each year.

Find the total exports and the total imports for the 17 years ending June 30, 1891, and the difference between the excess of exports and excess of imports for the same period.

SHORT METHODS.

791.

4,846	7,854
$\times 3\frac{3}{5}$	$27\frac{7}{9}$
14,538 3 times	54,978 7 times
$2{,}907\frac{3}{5}$ $\frac{1}{5}$ of 3 times	$6{,}108\frac{6}{9}$ $\frac{1}{9}$ of 7 times
157,08 20 times	
$17{,}445\frac{3}{5}$ *Ans.*	$218{,}166\frac{6}{9}$ *Ans.*

Multiply by 3, then add $\frac{1}{5}$ of this product.

1. $247 \times 4\frac{4}{7}$
2. $1{,}896 \times 5\frac{5}{8}$
3. $1{,}234 \times 6\frac{6}{11}$
4. $3{,}742 \times 7\frac{7}{10}$
5. $4{,}053 \times 7\frac{7}{9}$
6. $6{,}305 \times 9\frac{9}{11}$
7. $8{,}762 \times 23\frac{8}{9}$
8. $12{,}345 \times 32\frac{2}{3}$
9. $7{,}890 \times 105\frac{5}{7}$
10. $67{,}890 \times 234\frac{4}{5}$

792. Multiply 8,654 by 99.

865,400
856,746 *Ans.*

Subtract the number from 100 times the number.

11. $7{,}835 \times 99$
12. $9{,}427 \times 99$
13. $6{,}073 \times 99$
14. $5{,}483 \times 99$
15. $2{,}761 \times 999$
16. $8{,}305 \times 999$
17. $999 \times 1{,}234$
18. $999 \times 3{,}859$
19. $9{,}832 \times 990$
20. $7{,}543 \times 990$
21. $2{,}684 \times 25$
22. $9{,}321 \times 33\frac{1}{3}$
23. $8{,}693 \times 12\frac{1}{2}$
24. $4{,}862 \times 66\frac{2}{3}$
25. $3{,}025 \times 37\frac{1}{2}$
26. $3{,}464 \times 62\frac{1}{2}$
27. $4{,}872 \times 87\frac{1}{2}$
28. $860 \times 2\frac{1}{2}$
29. $6{,}318 \times 16\frac{2}{3}$
30. $9{,}204 \times 75$

793. Divide. Do not write products (Arts. 385, 616):

31. 41,874,365 ÷ 9,999
32. 123,456,789 ÷ 1,987
33. 300,200,100 ÷ 31,416
34. 254,637,809 ÷ 26,543
35. 837,029,456 ÷ 16,074.

794. Write answers: (Art. 385.)

36. $\frac{23146}{7809}$
37. $\frac{68400}{5709}$
38. $\frac{11223}{1984}$
39. $\frac{72063}{5999}$
40. $\frac{98643}{28643}$
41. $\frac{87631}{17025}$
42. $\frac{63336}{16895}$
43. $\frac{72084}{10203}$

795. Avoirdupois Weight. Long Ton.

In selling iron, coal at the mines, ores, etc., and in calculating the duties at the U. S. custom houses upon imported goods, the following table is used:

28 pounds (lb.)	1 quarter (qr.)
4 quarters	1 hundredweight (cwt.)
20 hundredweight	1 ton (T.)
1 cwt. = 112 lb.	1 T. = 2,240 lb.

796. The ton of 2,240 pounds is called a *long* ton. Unless otherwise specified in a problem, the cwt. of 100 lb. and the ton of 2,000 lb. are to be taken.

797. United States Civil Service. Weighers' Foreman, N.Y. Custom House.

State in figures the following amounts:

1. One billion eight hundred eleven.
2. Sixty-five million ninety thousand four hundred.
3. Six hundred sixty-six billion six.
4. Twenty-five hundred thousand twenty-five.

Express in words:

5. 663,020,030.
6. 7,000,007.
7. 666,666,666,666.
8. 400,044.
9. Add the above eight amounts.

10. Add $\frac{5}{8}$, $\frac{5}{6}$, and $\frac{3}{4}$ together.

11. Subtract $\frac{4}{5}$ from $\frac{6}{7}$.

12. Multiply 16 by $1\frac{1}{2}$.

13. Divide 5 by $\frac{7}{10}$.

14. Add 54.34, .375, 14.795, and 1.5 together.

15. Subtract .105 from 1.00075.

16. Multiply 9.125 by 16.25.

17. Reduce $\frac{54}{270}$ to a decimal fraction.

18. A cargo of sugar weighs 700 ton 4 cwt. 2 qr. and 15 lb. At 2¢ a pound, how much will the duty amount to? (1 ton = 2,240 lb.)

19. If 16 cwt. 2 qr. 11 lb. 10 oz. of flour be put into 9 barrels, how much will each barrel contain? (Long ton.)

798. U. S. Civil Service. Assistant Weighers, N.Y. Custom House.

1. Add the following, placing the total at the bottom:

$95,673,917,987.88
34,376,013,705.80
32,673,231,698.25
9,746,910,286.16
642,855.24
26,195,328,266.57
182,873.63
8,956,864,397.49
9,048,307,000.33

Express the following in figures:

2. Ten million three thousand one.

Express the following in sign and figures:

3. One million one hundred ten dollars and sixty-two and one-half cents.

Express the following sign and figures in words:

4. $10,500.75.

Express the following signs, abbreviations, and figures in words:

5. £225 5*s*. 3*d*. (£ = pounds; *s*. = shillings; *d*. = pence, English money.)

6. A coal dealer sold to a grocer 5 tons of coal at $6.75 per ton, and took in payment therefor 10 lb. coffee at 37½¢ per lb.; 2 lb. tea at 75¢ per lb.; 20 lb. sugar at 7½¢ per lb.; 5 lb. butter at 42¢ per lb., and the balance in cash. What amount did he receive in cash?

7. The standard wine gallon of the United States contains 231 cubic inches. How many cubic inches are there in 1 hhd. 1 bbl. and 2 qt.? (1 hhd. = 63 gal.; 1 bbl. = 31½ gal.)

8. At 37½¢ per sq. yd., how much will it cost to paint the outside of a tight board fence, 6 feet high, around a field 200 feet long by 150 feet wide?

9. A merchant purchased 50 bushels apples at $1.50 per bushel. He sold one-fourth of them, being damaged, at 20¢ per peck, and the balance at 50¢ per peck. Did he gain or lose by the transaction, and how much?

10. If a laborer received $900 for his services during the year 1887, what was his average daily pay, including Sundays?

Carry the answer to two decimal places.

799. Letter Carriers.

1. Express in sign and figures seventy-two million five thousand eighty-two dollars ten cents and two and one-half mills.

2. Express in words the following: 5,312,209.521.

3. Express in words the following: 10 mi. 8 fur. 640 rd. 1,760 yd. 10,560 ft. 6 in. = 16 mi. 6 in. (fur. = furlongs.)

4. A carrier makes 4 trips a day, carrying 64 letters and 32 papers each trip. The letters average in weight $\frac{1}{4}$ oz. each, and the papers 2 oz. each. How many pounds of mail does he deliver in a day?

5. Multiply 26.32 by 3, and to the product add 2.04.

6. Add the following, placing the sum at the bottom:

$5,321,792.18
359,212,175.75
11,515,666.66
2,919,286,554.55
115.25
999,510.45
4,786,452,369.38
29,236,111,522.73
75,775,016.15
90,187,236,541.02

7. A carrier delivers in one day 254 letters, 423 papers, and 27 packages. Each letter has on it a two-cent stamp, each paper a one-cent stamp, and each package a four-cent stamp. How much would the Government make or lose on this mail, supposing the whole cost of transportation and delivery to be $11.42?

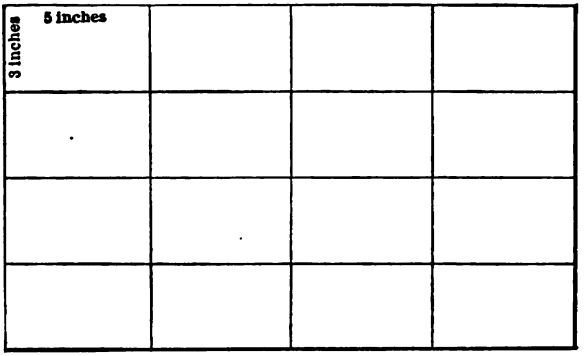
8. A carrier walks a distance of 20 squares each trip, each square being 400 feet in length. If he advances 20 inches each step, how many steps will he take on the trip?

9. A carrier, who makes 1,200 trips a year, rides on the street cars twice every trip, the fare being five cents a ride. What is the cost of street-car fare for the year?

10. In an office employing 35 carriers, each carrier loses 20 minutes a day in idle talk. Suppose the average salary of each to be $2.50 for ten hours' work, what is the cost to the Government of the lost time each day, and what will it amount to in a year of 313 working days?

MEASUREMENTS.

800. What is the length in inches of a row of four envelopes, each five inches long, placed end to end? What is the length in feet and inches?



1. What is the width in inches of four such rows just touching each other? What is the width in feet?

How many envelopes are there? How many sq. in. in each envelope? How many sq. in. are covered by all of them?

2. How many envelopes 5 inches by 3 inches would cover the top of a table 4 feet 2 inches long and 2 feet 6 inches wide?

3. Draw a rectangle to represent a floor 24 feet long 18 feet wide. Draw rugs 6 feet long, 3 feet wide, and see how many will be needed to cover the floor.

4. How many boards 12 feet long, 6 inches wide will be required for a floor 8 yards long, 6 yards wide?

If the boards run lengthwise, how many boards in length are used? How many boards wide?

5. Given the area in square inches of a surface to be covered with envelopes, and the area in square inches of an envelope, how is the number of envelopes ascertained?

If the area of the surface to be covered is given in square feet, how must we proceed?

6. Given the dimensions of a surface to be covered and the dimensions of the articles to be used for covering, how can we indicate the operations to be performed, without actually doing the work?

How about the denominations used; yards, feet, etc.?

7. How many bricks 8 inches by 4 inches will be needed for a walk 24 yards long, 6 feet wide, making no allowance for waste?

First indicate the work. Cancel.

8. How many paving tiles $\frac{1}{2}$ foot square will cover a hearth 6 feet long, 3 feet wide?

Make a diagram.

9. How many boards 12 feet long, 9 inches wide will be required for a close fence 120 yards long, 6 feet high?

10. Find the number of paving stones 9 inches by 3 inches, in a street 100 rods long, 10 yards wide.

11. A man buys a piece of ground 300 feet long, 150 feet wide. He builds a house, 50 feet by 30 feet, and a shed 12 feet by 13 feet. How many square yards will he have left for a garden?

12. There are 160 square rods in an acre. How many square yards are there in an acre?

13. Give the dimensions, in yards, of a field that will contain just an acre. Of one that will contain two acres.

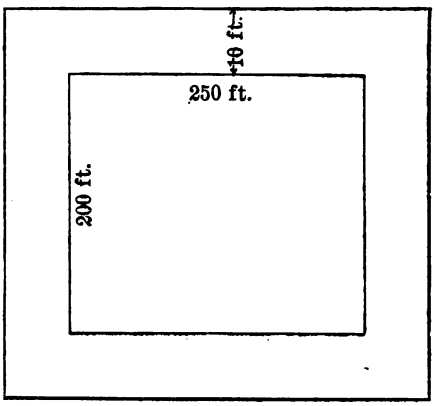
14. Draw a rectangle 2 inches $\times$ 3 inches. Draw one twice the size. What are the dimensions of the latter?

A plot 100 ft. $\times$ 100 ft. is how many times as large as a plot 25 ft. $\times$ 25 ft.?

15. How many square feet are there in a fence 10 feet high around a lot 250 feet long, 200 feet wide?

16. The owner of a piece of ground 250 feet long, 200 feet wide, takes 10 feet from each side to make a gravel walk, and uses the remainder for a garden. Give the dimensions of the garden and its area in square feet? How many square feet are taken up by the walk? How many square feet in the whole piece of ground?

17. How many square feet of flagging would be required for a sidewalk 10 feet wide outside a lot 250 feet long, 200 feet wide?



If 250 running feet of sidewalk, 10 feet wide, were laid on two sides of the lot, and 200 running feet on each of the other sides, would the job be finished?

18. At $80 per acre what is the value of a field 80 rods long, 70 rods wide?

What will it cost to fence the field at 20¢ per running yard?

19. A room is 24 feet long, 18 feet wide, 12 feet high. Draw, touching each other, four rectangles representing the four walls. Write the dimensions of each wall.

What are the dimensions of the large rectangle made up of the four smaller ones? Give the area in square feet. In square yards.

20. Show by a diagram the shape of a piece of paper that when folded will entirely cover a box 12 inches long, 6 inches wide, 4 inches high. Write the dimensions.

801. This is called the "development" of the box.
What is the area of the paper in square inches?

21. Make a diagram of a room 24 feet long, 18 feet wide, 12 feet high, showing the surface that is generally plastered.

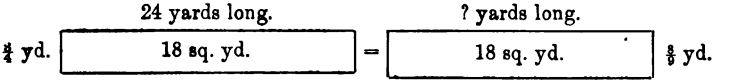
How many square yards of plaster will be needed for the above room, making no allowance for doors, windows, etc.?

22. What is the length of a rectangular field 60 rods long that contains 60 acres?

23. To contain 48 square yards, how many yards long must be a piece of carpet 27 inches wide?

24. I have bought 24 yards of dress goods, 27 inches wide. How many square yards does the piece contain?

How many yards of lining 32 inches wide will contain the same number of square yards?



25. How many square yards are there in 27 rugs, each 63 inches long, 45 inches wide?

TIME BETWEEN DATES.

802. Oral Problems.

1. How many hours from 3 o'clock Saturday afternoon to 9 o'clock Sunday morning?

2. How many days from May 1 to June 1?

3. A boy takes a spoonful of medicine every hour. If he takes the first dose at 2 o'clock, at what hour will he take the sixth? The second? The fourth?

4. A man begins work on the morning of the 6th and ends on the evening of the 11th. How much does he earn at $3 per day?

5. An importer receives some cases of goods numbered consecutively. How many cases are there if the lowest number is 29 and the highest number is 53?

6. How many posts 6 ft. apart will be needed for a fence 120 ft. long? For a fence 6 ft. long? 12 ft. long?

7. Find the time from Jan. 1 to Jan. 31, counting the first and the last day. Omitting both days.

8. How many days from July 4 to August 15, inclusive?

9. How many chapters from the 25th to the 49th, exclusive?

10. A girl begins at the 146th problem and solves all those on two pages. If the last is the 172d problem, how many does she solve?

803. In finding the time between dates, either the first or the last day is excluded; that is, from the 1st to the 21st is considered 20 days.

How many days from March 4 to Sept. 1?

Excluding March 4, there remain in the month 31 − 4, or 27 days. To this add the number of days in April, May, June, July, and August. Since March 4 is excluded, we take 1 day in September, making the total 181 days.

March 4 to March 31,	27	days.
April	30	"
May	31	"
June	30	"
July	31	"
Aug.	31	"
Sept.	1	"
Ans.	181	days.

804. How many days from

11. Jan. 1 to Feb. 19?
12. Oct. 31 to Dec. 30?
13. Sept. 30 to Dec. 16?
14. Nov. 1 to Dec. 19?
15. March 16 to April 25?
16. Feb. 29 to April 1?
17. May 21 to July 4?
18. April 7 to May 27?
19. June 10 to Aug. 1?
20. July 4 to Sept. 1?

805. Slate Problems.

(Take note of leap year.)

How many days from:

1. Feb. 6, 1892, to Oct. 1, 1892?
2. Oct. 14, 1892, to March 3, 1893?
3. Jan. 1, 1892, to April 19, 1892?
4. Dec. 23, 1891, to March 8, 1892?
5. Sept. 3, 1892, to Feb. 1, 1893?
6. March 16, 1892, to Dec. 25, 1892?
7. June 3, 1892, to Nov. 29, 1892?
8. Aug. 17, 1892, to Jan. 3, 1893?
9. April 4, 1892, to July 4, 1892?
10. May 16, 1892, to Oct. 14, 1892?

11. How much wages at $4 per day should a man receive from Monday, Jan. 2, 1893, to Feb. 28, inclusive, no pay to be received for Sundays or Washington's birthday?

12. A man borrowed $100 April 4, and returned it November 25. How many days' interest did he owe? (Do not include both days.)

13. May 1, 1893, fell on Monday. Upon what day of the week did July 4 fall?

14. How many days does vacation last if it begins on the morning of Saturday, July 2, and school commences on the first Tuesday of September?

15. A man borrows some money June 16, and agrees to return it in 60 days. On what date should he pay it?

16. A traveler starts upon a trip Aug. 24, 1894, and reaches home again Feb. 10, 1895. How long is he away?

806. When the difference between dates is more than a year, it is customary to take 30 days to each month. (See Appendix, Part III.)

Find the difference in time between March 3, 1879, and Jan. 1, 1893.

Writing 1893, 1st month, 1st day, we subtract 1879, 3d month, 3d day.

1893	1	1
1879	3	3
13	9	28

Answer, 13 years 9 months 28 days.

17. George Washington was born Feb. 22, 1732. How old was he at the signing of the Declaration of Independence, July 4, 1776?

18. Abraham Lincoln was first inaugurated president, March 4, 1861. How long had he served at his death, April, 15, 1865?

19. The battle of Lexington took place April 19, 1775. The treaty of peace was signed Sept. 3, 1783. How many years, months, and days between the two events?

20. How many years elapsed between the discovery of America by Columbus, Oct. 12, 1492, and the landing of the Pilgrims, Dec. 21, 1620?

21. General Harrison fought the Battle of Tippecanoe Nov. 7, 1811. He was inaugurated president 29 years 3 months 27 days later. Give the date of his inauguration.

22. How long was it after the treaty with England, signed Dec. 24, 1814, that the Mexican treaty was concluded, Feb. 2, 1848?

23. General Taylor died July 9, 1850. How long did he live after the capture of Monterey, Sept. 24, 1846?

24. President Garfield was born Nov. 19, 1831. How old was he at his inauguration, March 4, 1881?

25. The last battle of the Mexican war took place Sept. 14, 1847. The Battle of Bull Run was fought 13 years 10 months 7 days later. What was the date of this battle?

26. Find the time between July 4, 1776, and Jan. 1, 1894.

PERCENTAGE.

807. Oral Exercises.

1. Find 4% of $125.
2. 25% of 16.
3. 6% of 200 cows.
4. 1% of 150 lb.
5. 20% of 65 yd.
6. 33⅓% of 1 day.
7. 62½% of $12.
8. 9% of $23.
9. 75% of 3 gal.
10. 1¼% of $400.

808. Slate Exercises.

1. Find 6% of $576.
2. 4½% of $340.
3. 25% of 1,876 bu.
4. 12½% of 864 cows.
5. 50% of 432 yd.
6. 33⅓% of 576 soldiers.
7. 16⅔% of 696 gal.
8. 6¼% of $4.96.
9. 25% of $156.
10. 1% of $156.
11. ¼% of $156.
12. 50% of 480 hr.
13. ½% of 480 hr.
14. ⅛% of $1,420.
15. 3⅛% of $66.
16. 7½% of 360 days.

INTEREST.

809. In computing interest, the year is considered as composed of 12 months of 30 days each.

810. Oral Exercises.

Find the interest on :

1. $90 for 2 mo. at 4%.
2. $60 for 60 da. at 6%.
3. $100 for 2 yr. 6 mo. at 5%.
4. $120 for 30 da. at 5%.
5. $300 for 90 da. at 3%.
6. $100 for 1 yr. 3 mo. at 4%.
7. $50 for 3 yr. at 6%.
8. $100 for 2 yr. 4 mo. at 6%.
9. $60 for 40 da. at 6%.
10. $120 for 120 da. at 5%.

811. Find the interest on $63 for 4 yr. 5 mo. at 5%.

$63 is called the principal.

5 = rate.

4 yr. 5 mo. = time.

812. $\text{Interest} = \dfrac{\text{principal} \times \text{rate} \times \text{time (in years)}}{100}$.

4 years 5 months $= 4\frac{5}{12}$ yr. $= \frac{53}{12}$ yr.

$$\overset{.21\odot}{\$\cancel{63}} \times \frac{5}{\cancel{100}} \times \frac{53}{\cancel{12}_{4}} = \frac{\$55.65}{4} = \$13.91+ \quad \textit{Ans.}$$

NOTE. — The divisor 100 is canceled by placing a decimal point before 21.

Find the interest on $160.50 for 3 mo. 15 da. at 6%.

$$160.50 \times \frac{6}{100} \times \frac{3\frac{1}{2}}{12} = \overset{.8025}{\cancel{1.60}\odot\cancel{50}} \times \frac{\cancel{6}}{\cancel{100}} \times \frac{7}{\cancel{24}_{\cancel{4}\ 2}} = \frac{5.6175}{2} = 2.808+$$

Ans. $2.81.

Find the interest on $69.75 for 1 mo. 17 da. at 4%.

$$\overset{.00775}{.0\odot 69\odot 75} \times \frac{\cancel{4}}{\cancel{100}} \times \frac{47}{\cancel{300}_{\cancel{99}}} = .36425. \quad \textit{Ans.}\ 36 \text{ cents.}$$

813. Slate Exercises.

Find the interest on:

1. $192 for 3 yr. 7 mo. at 5%.
2. $60 for 2 mo. 12 da. at 4%.
3. $240 for 1 yr. 1 mo. at 6%.
4. $14.40 for 5 yr. 5 mo. at 5%.
5. $36 for 77 days at $4\frac{1}{2}$%.

6. $99 for 21 months at 6%.

7. $192 for 2 yr. 4 mo. at 5%.

8. $600 from Jan. 1 to Jan. 16 at 4%.

9. $1,200 from July 1, 1891, to Jan. 1, 1893, at 6%.

10. $57.60 from Oct. 4, 1890, to Feb. 4, 1894, at 5%.

REVIEW.

814. Oral Problems.

1. What part of $\frac{4}{5}$ is $\frac{3}{4}$? (16 twentieths, 15 twentieths.)

2. 16 is how many hundredths of 64?

3. What per cent of 25 is 5?

4. What part of 2 lb. 1 oz. is 1 lb.? (33 oz., 16 oz.)

5. Divide 4 gal. by 3 pt.

6. How many pencils at 4 mills each can be bought for a dollar?

7. Write $\frac{1}{80}$ as a decimal.

8. Divide 34 by 200.

9. At 20¢ per qt., what will be the cost of 2 gal. 3 qt. 1 pt. of maple syrup?

10. Find the cost of 4 T. 400 lb. of coal at $5 per ton.

11. A man puts 4 lb. 8 oz. of tea into 12 oz. packages. How many packages does he make?

12. 4 pecks 3 quarts of apples are given to some children. If each child's share is 5 quarts, how many children are there?

13. If it takes 3 hours 20 minutes to hoe a row of corn, how many rows can a man do in 2 days of 10 hours each?

14. How many square inches in the surface of a sheet of paper 1 ft. 8 in. long, 11 in. wide?

15. How many pieces of paper 2 inches square will exactly cover a slate 12 inches long, 8 inches wide?

815. Slate Problems.

1. What part of 6 hr. 17 min. 5 sec. is 3 hr. 15 min. 25 sec.?

2. If a man walks at the rate of 3 mi. and 96 rd. per hour, how far will he walk in 3 hr. and 20 min.?

3. What is one-ninth of 28 bu. 3 pk. and 7 qt.?

4. Three men buy a house for $1,200. A furnishes $600; B, $400; C, $200. They sell the house for $1,500. How much money should each receive?

5. If 5 T. and 1,000 lb. of coal cost $30.25, how much will be paid for 7 T. and 320 lb.?

6. At 25¢ per hour, how much should a man receive that works 8 hours and 36 minutes?

7. At $45 per month, what is the rent of a house for 2 yr. 7 mo. and 8 da.?

8. If 2 lb. 4 oz. of tea cost $1.35, what will be the cost of 11 lb. 12 oz.?

9. How many sq. in. in a paving tile 6 in. square? How many sq. in. in a rectangle 4 ft. by 3 ft.? How many paving tiles 6 in. by 6 in. would cover a surface 4 ft. by 3 ft.?

10. A merchant imports 360 yd. of dress goods, 27 inches wide, costing 30¢ per yd. What will the duty be at 8¢ per square yard, and 50 per cent of the cost in addition?

11. A man pays $60 interest per year. How much interest does he pay in 3 yr. 7 mo. 10 da.?

12. Find four-ninths of 28 bu. 3 pk. 7 qt.

APPROXIMATIONS.

816. Give an estimate of the answer (Art. 521):

1. If 3 T. and 1,988 lb. of coal cost $19.97, what will be the cost of 8 T. and 1 lb.? (Nearly 4 tons cost nearly $20.)

2. At $500 per year, what will be the rent of a house for 1 year 11 mo. and 29 da.? (Nearly 2 years.)

3. Find the cost of 5 bbl. sugar, averaging 299 lb. each, at $4\frac{6}{16}¢$ per lb.

4. What is the interest on $199.86 at 6%, for 5 mo. 28 da.?

5. If 11 men and 2 boys can finish a piece of work in $23\frac{1}{2}$ days, how long would it take 23 men and 5 boys?

6. What decimal of 639 acres is 321 acres?

7. What will be the cost of 20,060 bricks at $19.90 per M.?

8. A farmer sells 5,584 lb. of rye at 87¢ per bu. of 56 lb. How much does he receive?

9. If 9 lb. and 15 oz. of tea cost $7.95, what will be the cost of 21 lb. and 1 oz.?

10. Paid freight on 1,987 lb. at 70¢ per hundredweight. How much did I pay?

MEASUREMENTS.

817. Make diagrams when necessary.

1. A man has a lot 100 feet by 200 feet. How many square feet will he have left for a garden after he builds a house 25 feet by 60 feet?

2. One wall of a room is 24 feet long and 12 feet high. There is a door in it 8 feet high, $4\frac{1}{2}$ feet wide. How many square yards of plastering will be needed to cover the wall?

3. A brick is 8 inches long, 4 inches wide, 2 inches thick. How many square inches are there in the surface of the widest face? In the surface of one side? In the surface of one end?

4. How many bricks laid on the widest face will be needed for a walk 288 inches long, 96 inches wide?

5. How many bricks laid on the side will be needed for a walk 24 feet long, 8 feet wide?

6. Make a diagram of a piece of paper that when folded will just cover the six faces of a brick $8 \times 4 \times 2$ inches. How many square inches of paper would be needed?

7. How many square feet are there in a roll of wall paper 24 feet long, 18 inches wide?

8. How many rolls 24 feet long, $1\frac{1}{2}$ feet wide, would be required to paper the ceiling of a room 45 feet long, 36 feet wide, making no allowance for matching or waste?

9. The owner of a piece of ground 200 feet wide, 300 feet long, divides it into lots 25 feet by 100 feet. How many lots are there?

10. Make table of:

818. Square Measure.

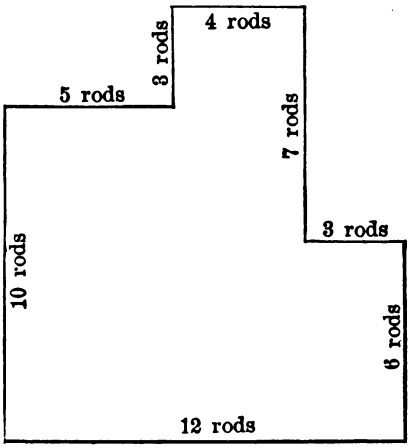
square inches (sq. in.)	1 square foot (sq. ft.)
square feet	1 square yard (sq. yd.)
square yards	1 square rod (sq. rd.)
160 square rods	1 acre (A.)
acres	1 square mile (sq. mi.)

11. The owner of a piece of ground 600 feet long, 150 feet wide, builds a fence 6 feet high around the plot. How many square feet of fence are there?

12. What would be the cost of building 1,800 feet of fence 6 feet high at $1 per square yard?

13. A farm is one mile square. How many 40-acre fields does it contain?

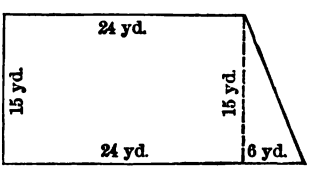
14. How many yards of fence will be needed to enclose the plot of ground shown in the following diagram?



15. The above field was originally a rectangle, but the owner sold one piece 5 rods by 3 rods, and a second piece 3 rods by 7 rods. How many square rods did it contain at first? What is its present area?

16. How many acres in a field in the shape of a triangle whose base and perpendicular measure 40 rods each?

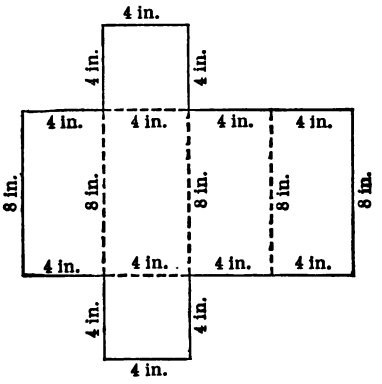
17. Calculate the number of square yards in the field shown in the accompanying diagram.



18. The owner of a field 160 yards long, 121 yards wide sold from one corner a triangular piece 40 yards long, 30¼ yards wide. Find the number of square yards in the part remaining. (Make diagram.)

19. How many acres are there in a triangular plot of ground when the base measures 80 yards and the perpendicular measures $60\frac{1}{2}$ yards?

20. What are the dimensions of the box that can be made of a piece of paper of the size shown in the following diagram? How many square inches of paper are needed for such a box (making no allowance for pasting)?



DENOMINATE NUMBERS. (*Long Measure.*)

819. Slate Exercises.

1. Change 43 yd. to rods and a fraction.
2. Change 43 yd. to rods and yards.
3. Change 43 yd. to rods, yards, and feet.
4. Change 43 yd. to rods, yards, feet, and inches.
5. Change 72 yd. to rods, etc.
6. Change 66 yd. to rods.

820. Change to rods, etc.:

7. 49 yd.
8. 147 ft.
9. 1,764 in.
10. $8\frac{10}{11}$ rd.
11. 50 yd.
12. 51 yd.
13. 153 ft.
14. 1,836 in.
15. 1,837 in.
16. 52 yd.
17. $49\frac{1}{2}$ yd.
18. 49 yd. 1 ft. 6 in.
19. $148\frac{1}{2}$ ft.
20. 1,782 in.

821. Change 1,581 in. to rods, etc.

12)1581 in.
3)131 ft. 9 in.
$5\frac{1}{2}$)43 yd. 2 ft. 9 in.
2 2
11)86
7 rd. 9 half-yards 2 ft. 9 in.
7 rd. $4\frac{1}{2}$ yd. 2 ft. 9 in.

7 rd. 4 yd. 2 ft. 9 in.
\+ 1 ft. 6 in. = $\frac{1}{2}$ yd.
7 rd. 5 yd. 1 ft. 3 in. *Ans.*

822. To find how many rods in 43 yards, we divide by $5\frac{1}{2}$. $5\frac{1}{2}$ yards = 11 half-yards. 43 yards = 86 half-yards. As there are 11 half-yards in a rod, 86 half-yards will be equal to 7 rods and 9 half-yards, or 7 rods $4\frac{1}{2}$ yards. Changing $\frac{1}{2}$ yd. to 1 ft. 6 inches, we obtain the answer as above.

823. Change to rods, etc.:

21. 1,483 in.
22. 984 in.
23. 1,345 in.
24. 2,796 in.
25. 1,121 in.
26. 1,470 in.
27. 3,453 in.
28. 1,278 in.
29. 1,576 in.
30. Change 5 rods to inches.
31. Change 990 inches to rods.
32. How many inches in 7 rods 1 yd.?
33. Change 1,422 inches to rods.

824. Add:

34.

4 rd.	3 yd.	1 ft.
9 rd.	4 yd.	2 ft.
3 rd.		1 ft. 6 in.

35.

7 rd.	5 yd.	
3 rd.		1 ft.
	2 yd.	2 ft.
4 rd.		1 ft.

36.

5 rd.	4 yd.	2 ft.
	5 yd.	1 ft.
6 rd.	1 yd.	

37.

11 rd.	3 yd.	1 ft.
4 rd.		2 ft.
	5 yd.	1 ft.
6 rd.		

38. From 8 rd. 1 ft. take 2 rd. 2 ft.

39. Find the difference between 3 rd. 1 yd. 1 ft. and 16 rd.

40. Multiply 5 rd. 4 yd. 2 ft. by 4.

41. Multiply 11 rd. 2 ft. by 10.

42. Divide 30 rd. 5 yd. 2 ft. by 8.

43. Divide 34 rd. 2 yd. by 9.

SOLID CONTENTS.

825. How many one-inch cubes can be placed on the bottom of a box 3 in. long, 4 in. wide?

1. If the box is one inch high, how many will it hold? If the box is 2 in. high? 3 in. high?

2. A cube one inch long, one inch wide, one inch high contains a cubic inch.

How many cubic inches in a box 3 in. long, 4 in. wide, 1 in. high? In a box 3 in. long, 4 in. wide, 2 in. high? In a box 4 in. long, 4 in. wide, 4 in. high?

3. If you had 24 one-inch cubes, how could you pile them to make a solid with six rectangular faces?

If the pile was 2 inches high, how many cubes would there be in each tier? How many square inches would the lower tier cover?

How could the 24 cubes be arranged to make a pile 3 inches high?

4. Can you give a rule for finding the contents of a box 6 in. long, 8 in. high, 4 in. wide?

5. How many cubic inches of water would a tin box hold, the dimensions of the box being 5 in. by $3\frac{1}{2}$ in. by 4 in.?

6. How many one-inch cubes could be placed in a box one foot long, one foot wide, one foot high?

7. How many cubic inches in a cubic foot?

8. How many one-foot cubes could be placed in a cubical box one yard long, one yard wide, one yard high?

How many cubic feet in a cubic yard? How many cubic inches in a cubic yard?

9. How many cubic inches in a solid, 3 yd. long, 2 ft. wide, 6 in. high? How many cu. ft.? How many cu. yd.?

Indicate the operations necessary in each case to obtain the correct answer.

What should be done with the denominations in each case before beginning the work of obtaining the solid contents?

10. A cord of wood contains 128 cu. ft. If the wood is cut into 4-ft. lengths, what should be the other two dimensions of a regular pile to hold just a cord?

11. How many cubic feet of air in a room 24 ft. long, 18 ft. wide, 12 ft. high?

12. A gallon contains 231 cu. in. Give the dimensions of a tin box that will hold exactly a gallon.

13. Find the solid contents of a piece of timber 25 ft. long, 3 ft. wide, 5 ft. thick. Is it larger or smaller than a piece 4 ft. wide, 4 ft. thick, and 23 ft. 6 in. long?

14. How many cubic yards of earth will have to be removed in digging a cellar 18 ft. wide, 55 ft. long, 6 ft. deep? What will be the cost at 60¢ a load (1 cu. yd.)?

15. Give the width of a wagon body 18 in. high, 6 ft. long, that will hold, when full, a cubic yard.

16. About how many gallons are there in a cu. ft.?

17. A bushel contains 2,150.4 cu. in. About how many cu. ft. in a bushel?

18. Find (by cancellation) the capacity in gallons of a tank 1 ft. 9 in. long, 1 ft. 3 in. wide, 1 ft. 10 in. deep.

19. Find (by cancellation) the capacity in bushels of a bin 1 yd. long, 2 ft. 4 in. wide, 5 ft. 4 in. high.

20. How many cords of wood (128 cu. ft.) are there in a pile 24 ft. long, 4 ft. wide, 12 ft. high?

21. A brick is 8 in. long, 4 in. wide, 2 in. thick. How many bricks are there in a pile 90 bricks long, 60 bricks wide, 30 bricks high? What are the dimensions of the pile?

How many cu. in. in 1 brick? In the pile?

22. Find the number of bricks in a wall 24 ft. wide, 48 ft. high, 1 ft. thick, making no allowance for mortar, etc.

23. How many bricks are there to a cu. ft.?

24. Allowing 20 bricks to a cubic foot when laid in mortar, how many bricks will be needed for a wall 24 ft. wide, 50 ft. high, 20 in. thick?

25. What will be the cost of building a stone wall 40 rods long, 4 ft. high, 1 yd. thick, at \$6.40 per perch of $24\frac{3}{4}$ cu. ft.?

APPROXIMATIONS.

826. Give sight answers in whole numbers:

1. If there are about $7\frac{1}{2}$ gal. to a cu. ft., estimate the number of gallons in a tank 5 ft. long, 3 ft. wide, 4 ft. high.

2. If there are about $1\frac{1}{4}$ cu. ft. in a bushel, estimate the contents in bushels of a bin 5 ft. $\times$ 3 ft. $\times$ 4 ft.

3. Give the dimensions of a tank of 150 gal. capacity.

4. Give the dimensions of a bin that will hold 100 bushels.

5. At 20 bricks laid in mortar to the cu. ft., give the length and the height of a wall 1 ft. thick that can be built with a thousand bricks.

6. At \$1 a load (1 cu. yd.), give the dimensions of an excavation that can be made for \$100.

7. A cu. ft. water (about $7\frac{1}{2}$ gal.) weighs $62\frac{1}{2}$ lb. About what does a gallon weigh? A pint?

8. If iron is about $7\frac{1}{4}$ times as heavy as water, about what does a cubic foot of iron weigh?

9. About what is $49\frac{3}{4}\%$ of \$801?

10. About what will be the interest at 6 per cent on \$100 for 3 yr. 11 mo. 29 da.?

827. Cubic Measure.

1,728	cu. in.	1 cu. ft.
27	cu. ft.	1 cu. yd.
231	cu. in.	1 gallon.
2,150.4	cu. in.	1 bushel.
128	cu. ft.	1 cord.

828. Troy Weight.

In weighing gold and silver, troy weight is used. The following is the table:

24 grains (gr.)	1 pennyweight (dwt.)
20 pennyweights	1 ounce (oz.)
12 ounces	1 pound (lb.)

The abbreviation for pennyweight is also written pwt.

829. The pound apothecaries' weight — used in putting up prescriptions — contains the same number of grains (5,760) as the pound troy.

830. The pound avoirdupois contains 7,000 grains.

831. Kansas City Public Schools. Examination Questions.

1. Write: Four hundred seven thousandths.
Six hundred four millionths.

Write in words 405.0067542.

2. Reduce to common fractions in lowest terms:
.004; .0125; 56.37½.

3. $16\frac{3}{4} \times .045 = ?$ $.324 \times .33\frac{1}{3} = ?$ $3.406 \times 1.00 = ?$

4. $.805 \div .35 = ?$ $80.5 \div 350 = ?$ Divide twenty-five thousandths by 16 millionths.

5. Mrs. C. B. Jones bought of Cole, Steele, & Co., of Indianapolis, as follows: Nov. 12, 1882, 23 yd. of muslin @ 16⅔¢; 45 yd. of sheeting @ 12½¢; Dec. 7, 12 yd. of silk @ $1.62½¢; 8 handkerchiefs @ 45¢; 2 pairs kid gloves @ $1.37½; 6 neckties @ 75¢. Make out and receipt the above bill.

6. How many grains in a pound apothecaries'? In a pound avoirdupois? In a pound troy? How many cubic inches in a bushel? In a gallon?

7. Draw a rectangle. What is the difference between three square inches and three inches square? Illustrate.

8. If a boy bought ⅝ of a bushel of nuts for $2.00, and sold them for 12¢ a quart, what was his gain?

Reduce $\frac{5}{12}$ of an inch to the fraction of a rod.

9. Reduce 35 quarts to the fraction of a barrel (31½ gal.).

3,450 cubic feet to cubic yards.

832. Wilmington, Del., Public Schools. Examination Questions.

1. Put the following in the proper form of a bill, find the amount of the bill, and receipt it:

David Wilson bought of Harry Lloyd, June 10, 1891, 7 lb. of oatmeal at 6¢ a pound; 10 lb. of sugar at 7½¢ a pound; 14 lb. of ham at 13½¢ a pound; 3 brooms at $2.25 a dozen.

2. When silver spoons cost $2.45 an ounce, what will one dozen spoons cost, if each spoon weighs 1 oz. 11 pwt. 16 gr.?

3. A family uses 2 qt. of milk a day. At 24¢ a gallon, what does the milk cost for May and June?

4. From March 3d to Sept. 19th is how many days? Do you include one of the days mentioned, or both of them, or neither of them?

How many minutes from 8.10 A.M. to 9.25 P.M.?

5. Subtract 40 rd. 3 yd. 2 ft. from 81 rd. 1 yd., and multiply the remainder by 10. Work by compound subtraction and multiplication, and get an answer that contains no fraction.

6. Draw and divide a figure so as to show how many square feet in a rectangle that is five feet long and three feet wide. Draw and divide a figure so as to show how many square inches in a surface that is 4 inches square. These drawings are to be free hand, and made with your pen.

7. A box is 4 in. long, 2 in. wide, and 2 in. deep. How many square inches on its surface? With the pen, sketch a free-hand development of this box. (See Art. 818, p. 422.)

8. Reduce 7 mo. and 15 days to the decimal of a year. (360 days.)

Reduce .3218 of 1 ton to whole numbers of lower denominations.

9. Write in words:

.0105; .000125; 1.001105; 11.4141; .000008.

10. If the diameter of a circle is 10, what is the circumference?

If the circumference of a circle is 12.5664 inches, how far is it from the centre to the circumference?

(Circumference = Diameter × 3.1416.)

833. St. Paul Public Schools. Examination Questions.

1. Three men incurred an expense of $14½. How much less than $8¼ must each pay?

2. How many feet around a square lot, one side of which measures $42\frac{3}{8}$ feet? Illustrate.

3. A owns $\frac{4}{5}$ of a ship; he sells 25% of his share for $2,700. What is the value of the ship?

4. Change $\frac{9}{10}$ and $\frac{3}{4}$ to decimals, and find their sum and difference.

5. .75 of a cord of wood, at $8 a cord, will pay for how much coal at $7.50 per ton?

6. Write analysis of first.

7. What is the value of a coffee urn, weighing 2 lb. 14 oz. avoir., at $1.80 per oz. troy?

$2\frac{1}{2}$ lb. avoirdupois of 7,000 grains each = how many troy ounces of 480 grains each?

8. For what is troy weight used? Give the table.

9. How many bushels of grain can be put into 15 bags if they hold $2\frac{2}{3}$ bushels each? Analyze.

10. A, B, and C together own a mill. A owns $\frac{1}{3}$ of it, and B $\frac{4}{9}$ of it. What part does C own?

CANCELLATION.

834. Indicate operations, and cancel where possible. Terms compared should be of the same denomination.

1. If 90 tons of coal cost $472.50, what will be the cost of 132 tons?

2. If 3 lb. and 4 oz. of tea cost $1.95, what will 12 oz. cost?

3. A party of men can build 16 rd. 2 ft. of wall in 20 days. How long will it take them to build 4 yd. and 6 in.?

4. What will be the cost of 3 bu. 2 pk. 7 qt. 1 pt. of oats if 7 bu. 1 qt. cost $4.50?

5. By traveling at the rate of 20 miles a day, a person can complete a journey in 18 days. At what rate must he travel to finish it in 15 days?

835. Questions from Examinations for New York State Certificates.

1. A farmer drew to market three loads of wheat, weighing respectively 2,873 pounds, 3,027 pounds, and 2,911 pounds. At 93¢ per bushel (60 lb.), how much did he receive for the three loads?

2. How many acres of land are there in a rectangular farm $\frac{1}{8}$ of a mile long and $\frac{2}{7}$ of a mile wide? (1 sq. mile = 640 acres.)

3. Reduce $\frac{2\frac{1}{2} \div 4\frac{2}{5}}{8\frac{4}{5} - 3\frac{1}{3}}$ to a simple fraction.

4. The sum of two numbers is $15\frac{3}{8}$, and one of them is $9\frac{11}{20}$. Find the other number.

5. If 3 be added to both terms of the fraction $\frac{5}{6}$, will the value be increased or diminished, and how much?

6. Multiply 24.234 by .346, and write the result in words.

7. Make and solve a problem to illustrate reduction descending; one to illustrate reduction ascending.

8. How is the value of a fraction changed by increasing its denominator? Why?

9. Add $\frac{3}{7}$ hr., $20\frac{3}{8}$ min., and 49.2 sec. Express the answer in minutes and seconds.

10. What fractional part of $31\frac{3}{25}$ is $12\frac{4}{5}$?

11. In a hotel the weekly wages of the clerk are $15, of the cook $7.50, of the porter $9, of the waiter $3, of the hostler $6, and of the errand boy $4. Find the average wages paid.

12. A man was born May 24, 1832. What is his age to-day?

13. Two persons start from the same place and travel in opposite directions, one at the rate of $4\frac{1}{8}$ miles per hour, and the other at the rate of $7\frac{3}{4}$ miles per hour. How far apart will they be at the end of $37\frac{1}{2}$ hours?

14. Find the cost of 7 lb. 11 oz. of cheese at 13¢ per pound.

15. A pile of 4-foot wood is 16 feet long and 6 feet high. Required the cost at $5.50 per cord. (1 cord = 128 cu. ft.)

16. Find the cost of digging a cellar 30 feet long, 15 feet wide, and 5 feet deep, at 30¢ per cubic yard.

17. A rectangular tank is 5 feet long, 2 feet wide, and 2 feet deep. How many gallons of water will it hold?

18. John Smith bought of Clark and Jones,

4 lb. 13 oz. beefsteak @ 21¢ per lb.
12 lb. of bacon @ 12½¢.

Make a properly receipted bill of the above, dated at the time and place of this examination.

19. Divide 96 ten-thousandths by 384 hundred-millionths.

20. What is cancellation? For what purpose is it used?

21. Find the cost of 2,315 pounds of coal at $5.75 per ton.

22. Write 1,249 in Roman notation.

23. Why does the value of a decimal remain unchanged when ciphers are annexed?

24. Given the dividend 807, and the quotient 34⅓. Find the divisor.

25. What will it cost to fill a jug, which contains 2,310 cubic inches, with vinegar at 7¢ a quart?

(1 gal. = 231 cu. in.)

836. Worcester Public Schools. Examination Questions. Oral.

1. How much will a man earn in three weeks at $1½ a day?

2. 37½¢; 75¢; 8⅓¢; 62½¢; 6¼¢. Give the equivalent or aliquot parts of a dollar.

3. How many rods are there in ⅝ of a mile?

4. How many pounds in one-quarter of a ton? How many pints in .25 of a bushel?

5. How many dozen eggs at 25¢ a dozen must be given for 100 pounds of sugar at 5¢ a pound?

6. Which would you rather have, $\frac{7}{8}$ of a dollar or 75¢? Why?

7. What will a gallon of molasses cost if a gill costs $2\frac{1}{2}$¢?

8. Give the names to the results in the four simplest processes in arithmetic.

9. $15 per week is how much per day?

10. $\frac{5}{6}$ of 72 is $\frac{3}{4}$ of what number?

11. How many yards is it around a room 15 ft. long and 12 ft. wide?

12. How many cubic feet in $\frac{2}{3}$ of a cubic yard?

13. Which is the larger and how much larger, $\frac{4}{5}$ of 30 or $\frac{5}{7}$ of 42?

14. Which is the larger and how much, $\frac{2}{3}$ or $\frac{3}{4}$?

15. How many cubic feet in a wall 30 feet long, 4 feet high, and 2 feet thick?

837. Worcester Public Schools. Examination Questions. Written.

1. Reduce to common fractions: .95; .526.

2. Reduce to decimal fractions: $\frac{4}{7}$; $\frac{5}{8}$.

3. From one thousand and (decimal) five thousandths take eight hundred and (decimal) eight hundredths.

4. Divide eight hundredths by four thousandths, and multiply the quotient by six ten-thousandths.

5. Bought 5 bu. of berries for $5.00, and sold them at $.20 a quart. How much did I gain?

6. How many spoons can be made from 9 lb. of silver, if one spoon weighs 60 dwt.?

7. From a tract of land 15 rods square I sold 65 square rods. What was the value of the remainder at $20 an acre?

8. What is the cost of fencing a field 9 rods square at $.12 a foot?

9. A pile of wood 40 ft. long and 12 ft. wide contains 1,920 cu. ft. How high is it?

10. How much will it cost to have it cut if it costs $8.00 a cord?

11. How many square yards are there in the walls of a room 20 ft. long, 18 ft. wide, and 9 ft. high?

12. What must I pay for the laying of a sidewalk 6 rods long and 5 ft. wide at $.45 a sq. yd.?

13. What is the cost of digging a cellar 21 ft. long, 18 ft. wide, and 6 ft. deep, at $.28 a cu. yd.?

14. How much will a block of granite weigh 15 ft. long, 12 ft. wide, and 9 ft. thick, if 9 cu. ft. weigh 72 lb.?

15. How much will it cost to plaster a room 18 ft. long, 15 ft. wide, and 9 ft. high, at $.17 a sq. yd., deducting 108 sq. ft. for doors and windows?

838. Massachusetts District Police. Inspection Department.

1. Write in figures the following number:

Fifteen million four thousand fifty-one.

Write in words the number expressed by the following figures:

6,201,504

2. Add the following column of figures:

131,042
275,634
187,965
98,325
346,424
764,326

3. Add together $2\frac{7}{15}$, $4\frac{5}{8}$, $3\frac{1}{6}$. Give the answer in mixed numbers.

Multiply $25\frac{3}{7}$ by $3\frac{1}{8}$.

4. Add together 201.23, 36.5, and .693; divide the sum by 4, and subtract 18.59896 from the product.

5. How many square yards are there in a plot of ground 165 feet long and 150 feet wide?

6. How many cubic feet will there be in a tank 16 feet 3 inches long, 9 feet 6 inches wide, and 6 feet deep?

839. Boston Public Schools. Examination Questions. Mental.

1. If $\frac{3}{5}$ of a barrel of flour cost \$2.13, what cost $1\frac{1}{5}$ barrels?

2. The difference between 144 and 24 is how many times 15?

3. John walked $12\frac{3}{4}$ miles, and Henry $10\frac{5}{8}$ miles. How much farther did John walk than Henry?

4. At $4\frac{1}{2}$¢ a pint, what costs 5 qt. 1 pt. of milk?

5. After spending $\frac{2}{5}$ of his money, James has \$150 left. What amount did he have at first?

6. How many gallons in 462 cu. in.?

7. How many pounds of cheese at $\$0.16\frac{2}{3}$ a lb. can be bought for \$5.00?

8. An agent collected rents amounting to \$300. What was his commission at $\frac{1}{2}$%?

9. If a boy eats $\frac{2}{5}$ of a loaf of bread, how many boys will be required to eat 10 loaves?

10. What is the distance around a room that is 40 ft. by 30 ft.?

11. If 5 yd. cloth cost 90¢, what cost $\frac{2}{3}$ yd.?

12. If $\frac{2}{3}$ yd. cloth cost 10¢, how many yd. can be bought for 80¢?

13. A step is 3 ft. 2 steps are what part of a rod?

14. A garden is 12 ft. long and 9 ft. wide. How many bunches of flowers will it furnish, if it takes 3 sq. ft. to furnish one bunch?

15. Find the interest of $200 for 1 yr. 3 mo. at 4%.

16. $9+3+7+6+5+4=?$

17. John had 85¢. He bought strawberries for 22¢; 1 lb. coffee for 30¢; 3 sheets paper at 1¢ a sheet. What remained?

18. Three-fourths of a mince pie is worth 18¢, and James eats $\frac{1}{8}$ of a pie. What is the value of what he eats?

19. If I have 1 pk. 2 qt. 1 pt. of meal, how many more qt., must there be to make 1 bu.?

20. Charles caught 12 fishes, worth $4\frac{1}{2}$¢ each, in four hours. His time was worth 12¢ an hour. Gain or loss, and how much?

21. A farmer raised 50 bushels of cranberries, and sold 60% of them. How many bushels did he sell?

22. What % of a number is $\frac{9}{20}$ of it?

23. How many times would a dish holding $\frac{3}{4}$ of a pint have to be filled to measure 9 quarts?

24. What would 42 lb. of butter cost at $33\frac{1}{3}$¢ a lb.?

25. If 5 chairs cost $80, what will 12 chairs cost?

26. How many hours from 4 A.M. to 8 P.M.?

27. Reduce $\frac{42}{52}$ to lowest terms.

28. A room is 36 ft. long and 30 ft. wide. How many sq. yd. in the floor?

29. Add $\frac{1}{2}$ to $\frac{3}{4}$, and take the sum from 5.

30. When the tax rate is $12 per $1,000, what will Mr. Smith's tax be if he owns $4,500 worth of property?

840. Boston Public Schools. Examination Questions. Written.

1. What is the cost of 60.51 tons of coal, when .9 of a ton costs $6.66?

2. Mr. Thompson has a field, around which he wishes to build a tight board fence. The field is 50 rd. long and 45 rd. wide. The fence is to be $4\frac{1}{2}$ ft. high. At $3\frac{1}{2}¢$ a sq. ft., what will be the cost of the fence?

3. A man having $100 went to market. He sold 10 bu. of potatoes at 80¢ per bu., 2 tons of hay at $15 per ton, and 25 bu. of oats at 45¢ per bu. He bought 15 bbl. of flour at $4.50 per bbl., and 12 yards of broadcloth at $4.75 per yard. How much money did he have left?

4. What is the commission on $5,678 worth of cloth at $2\frac{1}{2}\%$?

5. Find the product of the following numbers: .064, .0032, 15,625, and 31.25.

6. Cost of a pile of wood 10 ft. long, 4 ft. wide, and $4\frac{1}{2}$ ft. high, at $7.50 a cord?

I wish to pile 60 cords of wood in such a manner that it will be 4 ft. wide and 6 ft. high. How long must it be?

7. At 3%, what is the commission on the sale of 5,000 lb. of sugar at $6\frac{1}{4}¢$ per lb.?

8. What is that number to which if $\frac{2}{3}$ of itself be added the sum will be 235?

9. Express in per cents: $\frac{1}{2}$; $\frac{1}{8}$; $\frac{1}{5}$; $\frac{1}{4}$; $\frac{1}{6}$.

10. If .625 of a cord of wood costs $3.75, what will .75 of a cord cost?

At $17.625 a ton, how many tons of hay can be purchased for $95?

11. Mr. Ames owns $\frac{21}{22}$ of an acre of land. Mr. Jones owns $\frac{2}{3}$ as much, which is $\frac{7}{8}$ of what Mr. Brown owns. What part of an acre does Mr. Brown own?

12. Four men built a barn. A worked two days; B, six days; C, eight days; and D, 12 days. They received $84. What was each man's share?

13. A man has 768 hens, which is $\frac{1}{7}$ more than he had last year. How many had he then?

14. Two trains are $87\frac{1}{2}$ miles apart and running towards each other, one at the rate of $50\frac{3}{4}$ miles an hour, and the other at the rate of $20\frac{4}{5}$ miles an hour. How far apart will they be in half an hour?

15. What will be the simple interest on $8,042 for 3 mo. 24 da. at $4\frac{1}{2}\%$?

16. If 35 men earn $87.50 in 1 day, how much will 50 men earn in 10 days?

17. Multiply 9,008 by 7,080, and divide the product by 600.

What is the difference between 69×58.8 and $291 \div 0.97$?

18. How many sq. yd. in the walls of a room 12×15 ft. and 9 ft. high?

One of the drawing models is a square prism 8 inches long and 4 inches square. How many sq. in. on the whole surface of the model?

19. A clerk's income is $800. He pays 25% of it for board, and $33\frac{1}{3}\%$ of the remainder for clothes. How much has he left?

20. Find $6\frac{1}{4}\%$ of 19,712 miles.

$62\frac{1}{2}\%$ of 2,768 yards.

$9\frac{1}{11}\%$ of 11,223,344 pounds.

21. What is the interest of $150 for 2 yr. 8 mo. 15 da., at 6% per annum?

22. Add: 25,037.45; 8,712.23; 9,050.37; 815.25; 91,017.16; 419.19; 2,035.75; 15,025.55; 7,079.13; 14,026.27.

87.27; 43.75; 72.50; 39.75; 64.04; 58.94; 95.83; 26.37; 75.96; 50.83; 39.49; 97.08; 62.62.

23. How many feet in $62\frac{1}{2}\%$ of a mile?

What part of a day is 18 hr. 30 min.?

Reduce 3 tons 9 cwt. 17 lb. to ounces.

24. The floor of a room is $18\frac{1}{3}$ ft. long, $15\frac{1}{2}$ ft. wide. How many sq. yd. in the floor?

A lot of land containing 5,250 sq. ft. is 125 ft. long. How wide is it?

25. A man spent $\frac{3}{40}$ of his money for a house, $\frac{1}{10}$ for furniture, $\frac{1}{80}$ for horses, and $\frac{2}{5}$ to build a church. What part of his money had he left?

26. Bought 10,752 cu. ft. of wood at $\$8\frac{1}{2}$ a cord. What did it all cost?

27. $\frac{1}{4}\%$ of my money is in my pocket, 38% is in the bank, and the rest is in real estate. I have in all $\$24{,}000$. How much is in the bank and in real estate?

28. Change $\dfrac{\frac{2}{3} \text{ of } \frac{9}{7}}{15}$ to a simple fraction.

$9\frac{4}{5}$ times $\frac{1}{2}$ of $56\frac{3}{4}$ is how much?

29. An auctioneer sold for Mrs. Paul, on 10% commission, 14 chairs at $\$1.75$, 6 tables at $\$2.75$, 40 yd. carpet at $62\frac{1}{2}¢$ a yard, and a miscellaneous lot for $\$119.24$. What sum did Mrs. Paul receive after paying commission?

30. Cost of digging a cellar 27 ft. sq. and 9 ft. deep at $25¢$ a cubic yard?

REVIEW.

841. Add across:

1. $13\frac{1}{2} + 16\frac{2}{3} + 8\frac{3}{4}$
2. $4\frac{1}{4} + 5\frac{2}{5} + 27\frac{3}{8}$
3. $19\frac{1}{8} + 3\frac{5}{6} + 35\frac{1}{5}$
4. $8\frac{1}{2} + 9\frac{3}{10} + 14\frac{1}{6}$
5. $23\frac{3}{8} + 5\frac{1}{4} + 32\frac{5}{12}$
6. $59\frac{2}{7} + 3\frac{1}{2} + 4\frac{3}{4}$
7. $7\frac{5}{6} + 18\frac{2}{3} + 40\frac{1}{6}$
8. $35\frac{2}{3} + 51\frac{1}{5} + 8\frac{7}{10}$
9. $3\frac{7}{8} + 9\frac{1}{8} + 25\frac{7}{12}$
10. $66\frac{1}{2} + 8\frac{2}{5} + 14\frac{1}{8}$

842. Subtract across:

11. $25\frac{1}{4} - 18\frac{7}{12}$
12. $63\frac{3}{5} - 49\frac{2}{3}$
13. $70\frac{4}{11} - 15\frac{1}{2}$
14. $92\frac{5}{6} - 24\frac{7}{8}$
15. $33\frac{1}{3} - 15\frac{7}{10}$
16. $68\frac{3}{4} - 61\frac{1}{12}$
17. $100\frac{1}{9} - 62\frac{1}{4}$
18. $56\frac{1}{4} - 37\frac{4}{9}$
19. $83\frac{3}{7} - 43\frac{2}{3}$
20. $42\frac{1}{3} - 16\frac{2}{3}$

843. Multiply. Do not reduce to improper fractions:

$$\begin{array}{r} 12\frac{3}{4} \times 5\frac{1}{3} \\ \hline 63\frac{3}{4} \\ \quad 4\frac{1}{4} \\ \hline 68 \end{array}$$

21. $37\frac{1}{2} \times 3\frac{1}{2}$
22. $48\frac{3}{4} \times 4\frac{1}{3}$
23. $64\frac{1}{5} \times 10\frac{1}{8}$
24. $29\frac{3}{8} \times 6\frac{1}{4}$
25. $18\frac{7}{8} \times 5\frac{1}{2}$
26. $18\frac{1}{4} \times 7\frac{1}{3}$
27. $9\frac{3}{4} \times 8\frac{1}{3}$
28. $45\frac{1}{3} \times 2\frac{1}{6}$
29. $50\frac{2}{3} \times 10\frac{1}{7}$
30. $38\frac{3}{4} \times 11\frac{1}{3}$

844. Divide:

31. $13\overline{)205\frac{1}{2}}$
32. $14\overline{)186\frac{1}{2}}$
33. $15\overline{)250\frac{1}{2}}$
34. $16\overline{)198\frac{1}{2}}$
35. $21\overline{)450\frac{1}{2}}$
36. $31\overline{)970\frac{1}{2}}$
37. $24\overline{)553\frac{3}{4}}$
38. $25\overline{)568\frac{1}{2}}$
39. $32\overline{)965\frac{1}{2}}$
40. $36\overline{)722\frac{1}{4}}$

845. Miscellaneous.

1. Find the value of (*a*) $(6.125 + 8.75 - 9.1235) \div .0125$; (*b*) $(1{,}708.4592 \div .00024) \times .003$.

2. Simplify $\dfrac{7 - 3.004}{.2 + 7.3} \times \dfrac{5 - .08}{4.8} \div 1\frac{1}{5}$.

3. $(\frac{3}{5}$ of $\frac{7}{8}) + (\frac{2}{3}$ of $\frac{9}{7}) - (\frac{4}{5}$ of $2) = ?$

4. $\dfrac{\frac{1}{2} \text{ of } 7\frac{1}{2}}{\frac{3}{8} \text{ of } 15} - \dfrac{\frac{9}{10} \text{ of } 4\frac{3}{4}}{1\frac{1}{2} \times 11} = ?$

5. Add $8\frac{5}{7} + \frac{3}{7} + \frac{5}{6} + \frac{8}{11} + \frac{3}{5}$.

6. Find the value of $728 - \frac{3}{4} - \frac{1}{7} - \frac{3}{5} - \frac{1}{3}$.

7. $1\frac{1}{2} \times (\frac{3}{4} \div \frac{2}{3}) \times \frac{1}{3}$.

8. Reduce $\frac{7}{10}$ of $\frac{2}{3}$ of $\frac{3}{4}$ of $\dfrac{13.5}{7}$ to a decimal.

9. If .1875 of a vessel cost $\$273.12\frac{1}{2}$, what is the value of $\frac{5}{32}$ of it at the same rate?

10. A person owning $\frac{6}{10}$ of a factory sells 75 per cent of his share for $\$1{,}710$. What is the value of the whole factory?

11. Find $\frac{3}{7}$ of 2 days 5 hours 45 minutes.

12. What is the interest on $\$760$ for 5 months at $3\frac{1}{2}\%$?

13. If a piece of cloth is 20 yd. long and $\frac{3}{4}$ yd. broad, how broad is another piece which is 12 yd. long and contains as many square yards as the first?

14. Simplify $\dfrac{2\frac{1}{2} + 1\frac{1}{3}}{2\frac{1}{2} - 1\frac{1}{3}} \times \dfrac{1\frac{7}{12} - 1}{\frac{1}{4} + \frac{5}{8}}$.

15. A merchant insures property worth $\$20{,}000$ for $\frac{3}{4}$ of its value. How much does he pay, the rate being $1\frac{1}{4}\%$?

16. If 7 men can do a piece of work in $10\frac{1}{2}$ days, how long will it take 8 men and 5 boys to do the same work, each boy doing one-half as much as a man?

17. How many sq. inches in the surface of a cube 6 in. each way? How many sq. ft.?

What are the contents in cu. in. of the same cube? In cu. ft.?

18. How long is a post which is 5 ft. above water, $\frac{2}{5}$ of its length in the water, and $\frac{2}{5}$ in the mud? Diagram.

19. In a certain class ten boys are 9 years old, twelve are 10 years old, eight are 11, six are 12, two are 13, one is 14. Find the average age of the class.

20. What is the value of 2,890 lb. of hay at \$15.00 per ton?

21. How much will a man earn at \$3.50 per day, from Tuesday, Oct. 25, to the end of the year, exclusive of Sundays and legal holidays?

22. A surveyor's chain is 4 rods long and contains 100 links. What is the length of a link in inches?

23. 8 lb. of black tea costing 35¢ per lb. are mixed with 4 lb. of green tea costing 50¢ per lb. What is the value of the mixed tea per lb.?

24. A house and a lot cost \$8,100. What was the cost of each, if the house cost $3\frac{1}{2}$ times as much as the lot?

25. What will be the cost, at \$18 per M., of a pile of bricks 20 ft. long, 15 ft. wide, 6 ft. high? A brick measures 8 in. × 4 in. × 2 in.

26. At 56 lb. per bushel, what will be the weight of 73 bu. 3 pk. and 7 qt. of corn?

27. A man had 36 yd. and 8 in. of wire, and sold 13 yd. 1 ft. 9 in. What fraction of it has he left? What decimal? What per cent?

28. Property worth \$30,000 is assessed for taxation purposes at 80 per cent of its value. How much taxes must the owner pay at the rate of \$21.60 per \$1,000 of the assessed value?

29. A dealer imported 150 gross of lead-pencils costing \$2.40 per gross. How much duty will he have to pay at 50¢ per gross, and, in addition, 30% on the value?

ANGLES, TRIANGLES, QUADRILATERALS.

846. The following may be drawn free hand, the compasses being reserved for the geometrical problems in Chapter XVI.

1. Draw two lines meeting at a point.

These lines make an *angle*.

2. Draw two lines that will make four angles.

3. Draw two lines so as to make two angles.

Two such angles are called *adjacent* angles.

4. Make two equal adjacent angles.

Equal adjacent angles are called *right* angles. A line making a right angle with another line is said to be *perpendicular* to it.

5. Draw two lines so as to make one right angle.

Is the right angle made by two lines, each 10 ft. long, any larger than a right angle made by two lines, each 1 inch long?

6. What is the smallest number of straight lines that will enclose a space?

Draw a figure enclosed by the smallest possible number of straight lines. What is its name? Why?

7. Make a triangle having one right angle.

8. Can you draw a triangle having two right angles? Why? What name is given to lines that will not meet, no matter how far they are extended?

9. An angle less than a right angle is called an acute angle.

Draw a triangle containing an acute angle.

10. Can you draw a triangle containing two acute angles? Three acute angles?

11. An angle greater than a right angle is called an obtuse angle.

Draw a triangle containing an obtuse angle.

12. Can you draw a triangle containing three obtuse angles? Containing two?

13. Draw a triangle with sides 2 inches, 3 inches, 4 inches, respectively.

A triangle having no two sides equal is called a *scalene* triangle.

14. Draw a triangle having two equal sides.

This is called an *isosceles* triangle. The unequal side is called the base.

15. Draw an isosceles triangle with the base uppermost. With the base on the left. On the right.

16. Draw a triangle having three equal sides (an equilateral triangle).

17. Draw a square. Draw a rectangle 4 in. by 3 in.

How many right angles in each?

18. Draw a four-sided figure having its opposite sides parallel, but containing no right angle (rhomboid).

What kinds of angles does it contain? How many of each? Write name in each angle.

19. Draw a four-sided figure, having all its sides equal, but containing no right angle (rhombus).

20. Draw a quadrilateral (four-sided figure) having only two parallel sides (trapezoid).

21. Draw a quadrilateral having no parallel sides (trapezium).

22. Draw a rhombus, each side 2 inches. A square, each side 2 inches.

What is the difference between them? Which is larger?

23. A parallelogram is a quadrilateral that has its opposite sides parallel.

Name the parallelograms that have four equal sides (equilateral). Those that have four equal angles (equiangular).

24. The height of a parallelogram is called its altitude. Draw a rectangle, base $3\frac{1}{2}$ inches, altitude $2\frac{1}{2}$ inches. Draw a rhomboid, base $3\frac{1}{2}$ inches, altitude $2\frac{1}{2}$ inches. Draw several rhomboids of the above dimensions, all differing in shape.

25. Cut out of paper a rectangle, base 3 inches, altitude 2 inches. Cut out a rhomboid, base 3 inches, altitude 2 inches. Place one upon the other, and see how their areas compare.

26. Can you calculate the number of square inches in a rhomboid whose base is 3 inches and altitude 2 inches?

27. Draw a rectangle, base 4 inches, altitude 3 inches. Divide by a diagonal into two triangles. Mark in each triangle its area.

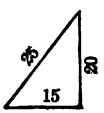
28. Draw a right-angled triangle, base 4 inches, perpendicular (altitude) 3 inches. Calculate its area.

29. Draw a rectangle, base 4 inches, altitude 3 inches. From the middle point of the upper base draw lines to the extremities of the lower base, making three triangles. Mark in each triangle its area.

30. Draw an isosceles triangle, base 4 inches, altitude 3 inches, and calculate its area.

847. Areas of Triangles and Quadrilaterals.

Find the areas of the following:

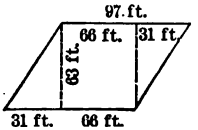


1. A right-angled triangle whose sides measure 15, 20, and 25 inches, respectively.

2. A right-angled triangle whose base measures 64 yd., perpendicular 48 yd.

3. A triangle whose base measures 18 rods, altitude 13 rods.

4. A square whose side measures 35 feet.

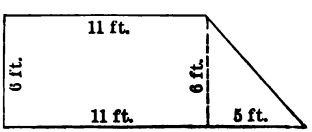


5. A rectangle 42 yd. by 37 yd.

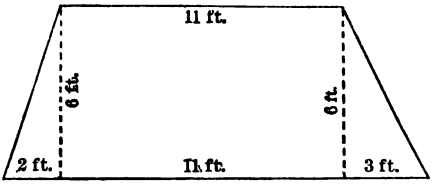
6. A rhombus whose base is 97 feet, altitude 63 feet.

7. A rhomboid, base 33 meters, altitude 28 meters.

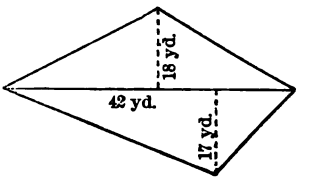
8. A trapezoid whose parallel sides measure 11 and 16 ft., respectively, the perpendicular distance between them being 6 ft.



9. A trapezoid as shown in the accompanying diagram.



10. A trapezium whose diagonal measures 42 yards, the perpendiculars to the opposite corners measuring 18 yd. and 17 yd., respectively.



CHAPTER X.

ALGEBRAIC EQUATIONS.

ONE UNKNOWN QUANTITY.

848. Oral Exercises.

1. What number increased by 12 equals 16?

2. 9 added to a number equals 14. Find the number.

3. What number diminished by 7 equals 8?

4. 18 diminished by what number has 10 for remainder?

5. Eight times what number equals 64?

6. What number multiplied by 9 gives 63 for product?

7. Three times a certain number added to twice the same number equals 40. What is the number?

8. 36 is equal to 10 times what number added to 8 times the same number?

9. The difference between 4 times a number and 3 times the same number is 72. What is the number?

10. Twice a number subtracted from 11 times the same number equals 27. What is the number?

849. Sight Exercises.

Give values of x, y, z, etc.:

1. $?+12=16$
2. $9+?=14$
3. $?-7=8$
4. $18-?=10$
5. $8x=64$
6. $9y=63$

7. $3x+2x=40$
8. $10z+8z=36$
9. $4v-3v=72$
10. $11w-2w=27$
11. $3x-2x+5x=54$
12. $10y+8y-4y=42$
13. $2x+4x=52-12$
14. $3z+4z=30-9$
15. $12y-5y=25+10$
16. $6w+6w=16+8$

850. Slate Problems.

1. A horse and a wagon cost together \$600. What is the price of each, if the wagon costs twice as much as the horse?

Let x = cost of horse;
then $2x$ = cost of wagon.
Cost of both $= 2x + x = 600$
$3x = 600$
$x = 200$
$2x = 400$

Ans. Cost of horse, \$200; of wagon, \$400

2. Divide 100 into two parts, one of which shall be four times as large as the other.

Let x = one part;
then $4x$ = the other.
$x + 4x = 100.$

3. \$18,000 is divided among three children, the second of whom receives twice as much as the first, and the third of whom receives six times as much as the first. Required the share of each.

x, $2x$, $6x$.

4. In a class of 54 pupils, there are twice as many boys as girls. How many are there of each?

5. The sum of two numbers is 78. One is five times as large as the other. What are the numbers?

6. 156 is equal to seven times a number added to five times the same number. Find the number.

7. The difference between three times a certain number and nine times the same number is 66. What is the number?

8. $27,000 is divided among three children, the second of whom receives twice as much as the first, and the third of whom receives three times as much as the second. What is the share of each?

9. The sum of two numbers is 72, and the greater is 5 times the other. What are the numbers?

10. John, Henry, and James have 54 marbles. Henry has twice as many as John, and James has as many as the other two. How many has each?

11. The sum of the ages of mother and daughter is 42 years. What is the age of each, if the mother's age is six times that of her daughter?

12. A man paid $96 for an equal number of hats and coats, paying $2 apiece for the former and $10 apiece for the latter. How many of each did he buy?

13. Divide 41 into four parts, the first being twice the second, the second three times the third, and the third four times the fourth.

(Let x = the fourth.)

14. The sum of three numbers is 180. The first is double the second, and the third is three times as large as the sum of the other two. What are the numbers?

15. Mr. Smith paid 81 cents for sugar and flour, the same quantity of each. For the sugar he gave 5¢ per pound, and for the flour 4¢ per pound. How many pounds of each did he buy?

16. The length of a rectangular field is 24 rods, its breadth is x rods, its area is 456 square rods. Find the value of x.

17. It takes 340 feet of fence to enclose a square lot. What are the dimensions of the lot?

18. Mrs. B. divides $120 between her son and her daughter. She gives the latter twice as much as she gives the former. What is the share of each?

19. The earnings of a man and his son during January amounted to $175, both having worked the same number of days. The father's wages were $4 per day, and the son's wages were $3 per day. How many days did they work?

20. The sum of $240 is divided among four children, two boys and two girls. Find the share of each, if each girl's share is double that of each boy.

21. A man worked twice as many days as his son. Their combined earnings amounted to $165. Find the number of days each worked, if the father earned $4 per day and the son three-fourths as much per day.

22. A boy's bank contains 78¢ in dimes, nickels, and cents. There are twice as many nickels as there are dimes, and three times as many cents as there are nickels. How many are there of each?

23. I paid 75¢ more for a roll of 15-cent ribbon than I did for a roll of 12-cent ribbon of the same length. How many yards did each roll contain?

24. A rectangular field whose length is four times its breadth requires 250 rods of fence to enclose it. What are the dimensions of the field? (Make diagram.)

25. A girl paid 60 cents for a speller and a reader, the cost of the former being one-third that of the latter. Find the cost of each.

26. The sum of two numbers is 72, and the smaller is one-fifth of the other. What are the numbers?

27. Mary, Susan, and Jane have 54 hickory nuts. Susan has one-half as many as Mary, and Jane has as many as the other two. How many has each?

CLEARING OF FRACTIONS.

851. Oral Exercises.

1. One-fifth of a number is 4. What is the number?

2. $\frac{1}{5}$ of a number is 8. What is $\frac{3}{5}$ of the number?

3. $\frac{1}{4}$ of a number is 12. What is the number?

4. $\frac{1}{4}$ of a number is 10. What is $\frac{3}{4}$ of the number?

5. If $\frac{3}{4}$ of a number is 30, what is the number?

6. One-half a number added to $\frac{1}{4}$ of the same number equals what fraction of the number?

7. One-half a number added to $\frac{1}{4}$ of the same number equals 30. What is the number?

8. One-third of a number + one-sixth of the number = what fraction of the number?

9. One-third of a number added to $\frac{1}{4}$ of the number = what fraction of the number?

10. $\frac{1}{3}x + \frac{1}{4}x =$ what fraction of x? $\frac{x}{3} + \frac{x}{4} = ?$

852. When $x = 32$, find the value of three-fourths of x; *i.e.*, $\frac{3x}{4}$.

When $\frac{3x}{4}$, ($3x$ divided by 4) $= 24$, what is the value of $3x$? Of x?

Find the value of y, when $\frac{y}{3} = 12$. Of $2y$, when $\frac{2y}{3} = 24$.

Given the equation $\frac{4z}{5} = 20$; by what whole number can we multiply the first member to get rid of the fraction? If we multiply one member of an equation by any number, what must we do to the second member in order to preserve the equality?

853. Sight Exercises.

Give values of x, y, z, etc.:

1. $\frac{x}{5}=4$
2. $\frac{2y}{5}=8$
3. $\frac{z}{4}=7$
4. $\frac{3v}{4}=21$
5. $\frac{w}{2}+\frac{w}{4}=12$
6. $\frac{x}{2}+\frac{x}{3}=5$
7. $\frac{y}{3}+\frac{y}{6}=10$
8. $\frac{z}{3}+\frac{z}{4}=7$
9. $\frac{v}{5}+\frac{v}{5}=8$
10. $\frac{w}{3}+\frac{2w}{3}=32$
11. $\frac{x}{4}+\frac{x}{5}=9$
12. $\frac{x}{2}+\frac{2x}{5}=9$

854. Slate Exercises.

Find the value of the unknown quantity (x).

In each of the following equations, multiply both members by the least common denominator of the fractions.

1. $\frac{x}{2}+\frac{x}{3}+\frac{x}{4}=26$

Multiplying by 12, we have $6x+4x+3x=312$

2. $x+\frac{x}{2}+\frac{x}{3}=44$

Multiply by 6. $6x+3x+2x=264$

3. $\frac{x}{2}+\frac{x}{3}=35$
4. $\frac{x}{3}+\frac{x}{4}=49$
5. $\frac{x}{2}+\frac{2x}{3}=28$
6. $\frac{3}{5}x+\frac{5}{7}x=92$
7. $\frac{2x}{3}+\frac{3x}{4}=102$
8. $2\frac{7}{8}x=115$
9. $\frac{4x}{5}-\frac{2x}{3}=48$
10. $x-\frac{x}{40}=156$
11. $\frac{3x}{2}=27$
12. $1\frac{1}{2}x=27$
13. $\frac{11x}{4}=22$
14. $2\frac{3}{4}x=44$
15. $2x+\frac{3x}{4}=33$
16. $x+\frac{x}{5}=24$
17. $\frac{75x}{100}-\frac{33x}{50}=81$
18. $3\frac{1}{2}x-2\frac{3}{4}x=45$
19. $\frac{8x}{3}-\frac{2x}{5}=136$
20. $3\frac{5}{8}x=116$

21. $\frac{x}{2}+\frac{x}{3}+\frac{x}{4}=39$

22. $x-\frac{x}{2}-\frac{x}{3}=37$

23. $\frac{4x}{5}-\frac{2x}{9}+\frac{3x}{4}=239$

24. $\frac{5x}{9}+\frac{2x}{3}-\frac{x}{2}=52$

25. $x-\frac{3x}{4}=80$

26. $x+2x+\frac{3x}{7}=24$

855. Slate Problems.

1. The sum of two numbers is 90, and the smaller number is one-fifth of the larger one. What are the numbers?

$$\left(x+\frac{x}{5}=90.\right)$$

2. Divide 100 into two parts, one of which shall be $2\frac{1}{2}$ times the other.

3. After losing $\frac{1}{8}$ of his money, a man has \$714. How many dollars had he at first?

$$\left(x-\frac{x}{8}=714.\right)$$

4. A horse was sold for \$240, the seller thereby gaining one-third of what he originally paid for it. How much did he pay for it?

$$\left(x+\frac{x}{3}.\right)$$

5. One-half of a number added to one-fourth of the same number equals $66\frac{3}{4}$. What is the number?

6. The difference between $\frac{3}{4}$ of a number and $\frac{2}{5}$ of the same number is 15. Find the number.

7. One number is $\frac{2}{3}$ of another. Their sum is 55. What are the numbers?

8. Find a fraction equivalent to $\frac{7}{8}$, the sum of its numerator and its denominator being 60.

(Let $7x$ = numerator and $8x$ = denominator.)

9. Find a fraction equivalent to $\frac{5}{7}$, the difference between its numerator and its denominator being 24.

10. The sum of two numbers is 480, and the quotient obtained by dividing the greater by the less is 7. What are the numbers?

11. Find two numbers whose difference is 522 and whose quotient is 30.

12. A boy buys apples at 2¢, pears at 3¢, and oranges at 4¢, the same number of each. How many of each does he buy, if he pays 81¢ for all?

13. A girl bought 70 cents' worth of peaches and plums. She paid 3¢ each for the peaches and 2¢ each for the plums, buying four times as many of the former as of the latter. How many of each did she buy?

14. $1,500 is divided among three persons, the second of whom receives three times as much as the first, and the third three and one-half times as much as the first. Find the share of each.

15. A farmer paid for a cow three-sevenths as much as he paid for a horse. How much did he pay for each, if the latter cost $80 more than the former?

16. Three times a man's money increased by two-thirds of his money is equal to $1,100. How much money has he?

17. After giving away $\frac{3}{8}$ of his marbles and losing $\frac{1}{4}$ of them, Joseph has 24 left. How many had he at first?

18. Bought a coat, a hat, and an umbrella for $15, paying for the hat $1\frac{1}{2}$ times as much as for the umbrella, and for the coat $3\frac{1}{3}$ times as much as for the hat. Find the price of each.

19. A merchant purchased two pieces of cloth for $240, paying for one piece twice as much per yard as for the other. The former contains 36 yards and the latter 48 yards. How much does he pay per yard for each?

20. A farmer sold 4 times as many cows as horses, receiving for all $840, at the rate of $40 for a cow and $120 for a horse. How many of each did he sell?

TRANSPOSING.

856. Sight Exercises.

Give values of x, y, z, etc.:

1. $x+15=21$
2. $2y+15=21$
3. $z-7=21$
4. $4w-7=21$
5. $\frac{v}{2}+3=8$
6. $\frac{x}{2}-3=12$
7. $3y+6=15$
8. $7y-13=15$
9. $9y+13=58$
10. $3y-10=56$
11. $\frac{3v}{4}+1=7$
12. $\frac{4w}{5}-1=11$

857. If $x+15=21$, $x=21-$ what?

When $x-7=21$, $x=21+$ what?

If in the equation $2x+15=21$, we take away 15 from the first member, what must we do to the second member to preserve the equality?

By *transposing* we mean bringing the unknown quantities (x, y, z, etc.) to one side of the equation, and the known quantities to the other.

NOTE. — In bringing a quantity from one side of the equation to the other, the *sign* of the quantity is changed.

858. Slate Exercises.

Find values of the unknown quantities.

NOTE. — Clear of fractions when necessary; then transpose.

1. $x+37=56$
2. $4x-5=83$
3. $3x-43=98$
4. $7x+13=111$
5. $x+3x=25+11$
6. $5x=x+40$
7. $3x-20=x-8$
8. $12-3x=45-4x$

9. $3x-6=48+x$

10. $3x+6=9-2x+12$

11. $2x-2-16=x+10$

12. $\frac{x}{3}-8=24$

13. $\frac{x}{6}+4-7=21$

14. $\frac{x}{2}+\frac{x}{3}=10+5$

15. $7x-5x=20+x+4$

16. $6x-14=16+x$.

17. $2x-11+6x-60=5x+25$

18. $\frac{x}{2}+\frac{x}{3}-5=10$

19. $2x-6=16+\frac{x}{2}-\frac{x}{3}$

20. $2x+\frac{3x}{5}-\frac{x}{2}=\frac{3x}{4}+27$

859. Slate Problems.

1. The sum of three numbers is 51. The second is 5 less than the first, and the third is 10 less than the first. What are the numbers?

Let x = first number,
$x-5$ = second number,
$x-10$ = third number;
$x+x-5+x-10=51$.
Transposing $x+x+x=51+5+10$,
$3x=66$,
$x=22$, first number,
$x-5=17$, second number,
$x-10=12$, third number.

2. Add 45 to four times a number, and you will have seven times that number. What is the number?

$(7x=45+4x.)$

3. Nine times a number less 27 equals six times the number. Find the number.

4. Two boys have together 48 marbles. One has 18 more than the other. How many has each?

$(x, x+18.)$

5. The length of a rectangular lot is 75 feet more than the breadth. The distance around it is 250 feet. What are its dimensions?

6. A piece of land containing 86 acres is to be divided into two fields, one of which shall be 8 acres larger than the other. How many acres in each field?

7. At a certain election 2,436 votes were cast for two candidates, the successful one receiving 318 more votes than his opponent. How many votes did each receive?

8. A man, being asked his age, replied that if he were half as old again and 7 years more he would be 100. What was his age?

9. The sum of two numbers is 96, and their difference is 72. Find the numbers.

(Let x = less, $x + 72$ = greater.)

10. After paying $\frac{1}{3}$ and $\frac{1}{4}$ of my debts, I still owe \$45. How much did I owe originally?

11. Divide 45 into two parts, one of which shall be 6 less than twice the other.

12. William has \$5 more than John, and three times William's money added to five times John's would be \$103. How many dollars has each?

13. I bought 3 cows and 4 horses for \$635, paying \$80 apiece less for the cows than for the horses. How many dollars apiece did I pay for each?

14. Mary has a dollar in dimes and five-cent pieces. She has 11 more of the latter than of the former. Find the number of pieces of each denomination.

15. Divide 100 into two parts whose difference shall be 48.

16. In a class of 54 pupils, the girls outnumber the boys by 12. How many are there of each?

17. $18,000 is divided among three children, the second of whom receives $2,400 more than the first, and the third of whom receives $2,400 more than the second. Find the share of each.

18. The greater of two numbers is 11 more than 3 times the less. Their difference is 33. What are the numbers?

19. A boy spent a dollar for postal cards, 2-cent stamps, and 5-cent stamps. He bought 15 more 2-cent stamps than 5-cent stamps, and 15 more postal cards than 2-cent stamps. How many of each did he buy?

20. A farmer has 88 head of stock — horses, cows, and sheep. He has 17 more cows than horses, and the number of sheep is 22 greater than that of the cows and horses together. How many are there of each?

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